COAL AGE

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Mechanical Energy versus Human Muscles

IT HAS been stated that the mines of this country must produce between 75 and 80 million more tons of bituminous coal this year than every before or some of our industries will be forced to go on short fuel rations. Of the two alternatives, that of increased production is the more desirable in every sense.

Increasing the output of coal is much like multiplying a vulgar fraction—we may either mutiply the numerator or divide the denominator. In other words, we may either increase production by working the present labor supply under existing methods a greater portion of the time, or we may change the means, methods or manner of working but expend the same amount or less of physical exertion.

To increase the amount of manual labor of any individual in a given length of time or to greatly increase the hours of labor both have their obvious limitations. Nature will not stand being driven too far. A change of method, on the other hand, usually entails a considerable increase in mechanical equipment; but the results attained often pay handsome dividends upon the initial outlay.

As an example of how mechanical equipment may aid physical effort, let us consider the following: A man traveling on foot can cover, say, 20 miles a day. We change the process of locomotion—substitute ball bearings and rubber tires for shoe leather—place the man on a bicycle, and with the same muscular effort he can cover 60 miles a day. Let us now make another substitution and place the man on a motorcycle. He is now able to travel 200 miles a day with even less effort than he walked 20 miles. Thus by the aid of mechanical help the man's "mobility" has been multiplied by ten, yet his physical effort has been decreased.

All the operations involved in the production of coal are not so readily solved by the application of mechanical energy as is the simple case of locomotion cited above. Many of them, such as undercutting for instance, have already been accomplished, while others still await solution or have as yet been only imperfectly or partially solved.

One important consideration to remember when considering the installation of mechanical equipment is that man's muscles are so weak that they can but little more than move his own limbs; his brain is big enough and active enough to guide and control the largest and most complicated machines that he has yet devised.

Without sufficient fuel our war effort must slow down. There is but one way to produce more coal with fewer men, and that is to substitute mechanical energy for human muscles. Have you done your level best to increase output at your mine by putting in plenty of equipment? Every eye in America is focused on the producers of coal.

IDEAS AND SUGGESTIONS

Simple Face Conveyor

BY H. G. DAVIS
Kingston, Penn.

The mining of the thinner or poorer quality beds of anthracite in the Lackawanna and Wyoming fields brought with it new and perplexing problems. The depleting also of the operating forces by the war and the increased demand for coal has resulted only in adding seriously to the perplexing situation already existing.

The coal mining companies have therefore been placed at their wits' ends to devise means for keeping

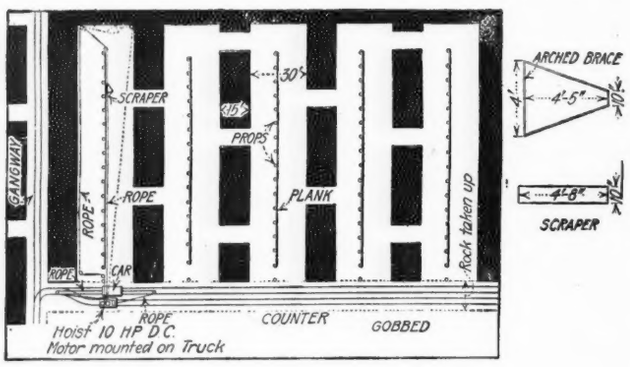


DIAGRAM OF SCOOP AND ITS OPERATION

up anything like a normal output. The Delaware & Hudson Coal Co. has successfully introduced in some of its mines in the vicinity of Scranton a loading arrangement that appears to be giving satisfactory results.

The scraper or conveyor used in bringing the coal from the face to the gangway or loading road is made of $\frac{3}{8}$-in. steel, and is reinforced at the top and bottom with light angle iron. It is V-shaped, 10 in. wide at the rear end, 40 in. wide at the front, 4 ft. 5 in. long and has no bottom. It is braced across the top by a piece of $\frac{1}{2}$ x 2-in. iron, in a bow shape, so as not to interfere with the releasing of the load at the car, or discharging point, as shown in the accompanying illustration.

I am informed that with this arrangement the Delaware & Hudson Co. is loading out 25 to 30 cars per shift of eight hours, from a panel of four to six chambers in a bed 38 in. thick. This system can be successfully used in the thicker beds of this region, and the man power employed thus made much more productive.

I have been informed also that Cadwallader Evans, Jr., who is now with the International Salt Co. as general manager, is applying this method for loading salt in the mines of northern New York. I might incidentally state that Mr. Evans was the first to introduce this system in the coal mines, and I am under the impression that he has patented some parts of the equipment.

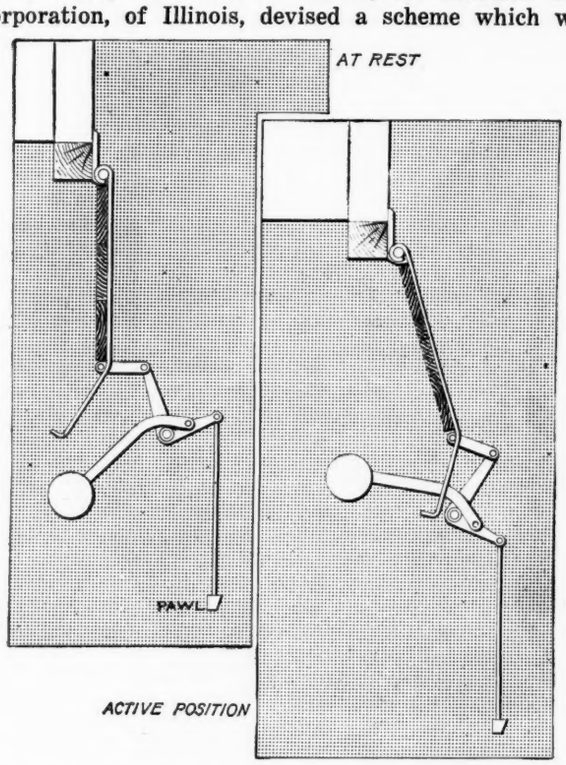
As already stated, there is no special reason why this invention could not be used more universally for loading anthracite coal, particularly in thin beds, so as to avoid the necessity for expending the large amount of energy now wasted on the top and bottom rock cut necessary to make height for mine cars, and in the thicker beds in which the pitch is not enough for the coal to run on sheet iron and is too heavy for cars.

There are several other face conveyors on the market which are quite successfully used in connection with the undercutting machine. The adaptability of all of these should be investigated by the employers of labor today, in order to assist in a greater production during the present crisis.

An Automatic Deflector

There is always danger to men working at shaft bottoms—especially at times of caging cars—from pieces of coal or other objects falling down the shaft. The open space between the cage top and the side of the shaft may be a source of danger to men passing underneath when the loaded car is being run onto the cage. At such times anything falling down the shaft may strike unprotected workmen.

To remedy this state of affairs, the Madison Coal Corporation, of Illinois, devised a scheme which was



TWO POSITIONS OF AUTOMATIC DEFLECTOR

installed at its No. 6 mine near Divernon, Ill. An automatic deflector was attached to the collar at the shaft bottom on the side of the shaft nearest the loaded sidings, at each compartment. The device is shown in the accompanying illustration at rest on the left and in

active position on the right. Each deflector constitutes a 3 x 6-ft. wooden shield.

In operation, when the cage about reaches the bottom landing it engages a pawl which connects by rod, bell crank and connecting link with the bottom of the deflector. The shield is thus moved into the active position shown by the illustration, thus roofing over the open space between the cage top and the side of the shaft. When the deflector shield is in the active position it intercepts falling objects and protects the men passing underneath it.

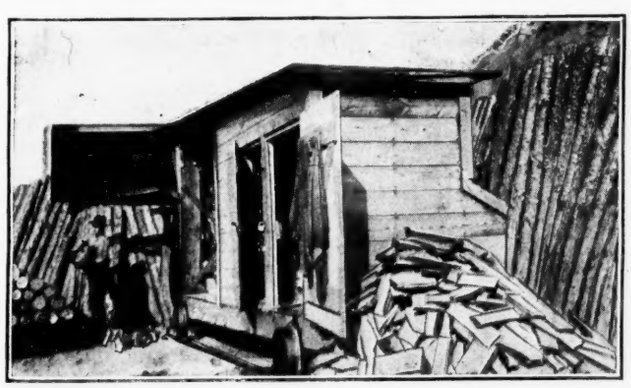
The policy of the more progressive companies is to guard against accident or injury to their employees in every practicable way. Automatic safety devices often do more than conserve life and limb, they may bring about greater efficiency through increased security.

Portable Saw for Mine Use

Instead of taking the wood to the saw, the mill is moved to the timber at the Glen Carbon plant of the Madison Coal Corporation, of Illinois. At this mine considerable prop timber is stored at the plant, as it is used in large quantities underground. The prop timber is stacked on the ground so as to be convenient to a track which runs the length of the yard.

A portable home-made sawmill runs on this railroad-gage track, as shown in the accompanying illustration. A 36-in. circular wood saw and a 25-hp. motor are mounted on a truck built of 8 x 10-in. sills. A pair of wheels at each end and a house superstructure to protect the machinery and operating workman in bad weather complete the outfit. A feed wire through the yard permits of electrical connection at any point, for power for the motor on the truck.

The circular saw can be seen at the front left-hand corner of the truck, directly over one of the track wheels.



PORTABLE SAW IN TIMBER YARD

Suitable arrangements are provided for holding the timber being cut. The mines use so many props that the timber covers a lot of ground, and it is much easier to move the saw up as the timber is used than to handle timber over a large yard to a stationary mill. At the Glen Carbon mine one prop is required for every 3½ tons of coal mined; at the No. 6 plant of the Madison Coal Corporation one prop is used for every 10 to 12 tons produced. Ordinary mine requirements in this section call for props with a 4-in. diameter, small end, as a minimum. Where smaller timber is received in a lot, it is utilized for mine track ties.

Keeping Track of Miners' Safety

By ERNEST L. MANDEL
Editor, "Magyar Munkaslap," New York City

In my travels through the coal fields of southwestern Virginia I noticed with interest the practice of the Stonega Coal and Coke Co., of Big Stone Gap, Va., which operates 16 mines at seven plants, all the plants being electrically operated. C. G. Duffy, the superintendent,

Stonega Coke and Coal Company

_____ PLANT

No._____ Mine _____ 191__

Mine Foreman

Check Number	Experienced		Time Inspected	Props on Hand		Miner Notified to Set Props	Miner Notified To Take Down Roof Slate		Condition of Roof		
	Yes	No		Yes	No	Number	Yes	No	Good	Fair	Bad
			M								

THIS RECORD SAFEGUARDS MINER'S LIFE

has an interesting form for recording the condition of the roof and the means taken and the provisions on hand to protect the miners. This form was prepared by R. E. Taggart, the general manager of the company, and it appears to have done good work in prevention of accidents. The Stonega plant, at Stonega, Va., for instance, in 1917 mined over a half a million tons of coal without a single fatal accident. The record this year up to the close of April was equally good.

Backing Up Our Soldiers

The first thing they teach soldiers is teamwork—the "get-together" idea. For it's teamwork, and teamwork alone, that wins battles.

So it behooves us war savers to "get together" too. Wherever you and others get together for work or play, form or join a team of war savers whose purpose will be to get folks all working together on this big idea of thrift (systematic saving) to win the war. The Government calls these teams War Savings Societies and is counting on them for real service.

Just think of it—25 members of a War Savings Society, by each buying four Thrift Stamps a week, can in six months supply a whole company of soldiers with steel helmets.

Also, this team idea sets new and patriotic standards of living. It becomes the popular thing to do with less; to make what we have do a little longer.

By buying only the needful things we give the Government a better market wherein to purchase things for soldiers.

Join or start a team of savers today. Sign a promise to spend wisely, save regularly and invest your savings in Thrift or War Savings Stamps. Talk over new ways to save. Get your friends into the game—sign them up for the team.

It's not the individual
Or the army as a whole,
But the everlasting team work
Of every bloomin' soul.—*Kipling.*

Increased Coal Output by Stripping

By A. C. VICARY
Erie, Penn.

SYNOPSIS—*Wherever the stripping method of producing coal can be employed it should be used, as it effects a 75 per cent. saving in labor per ton. Contrary to popular belief, small steam shovels will handle overburden at practically the same cost per cubic yard as the large special machines.*

ANY coal operator knows a great deal more about actually mining coal than I do. Before making even the most modest suggestion relating to underground mining, I would make doubly sure of my premises, and even then go very slowly. But I don't feel so much hesitancy in talking about strip-pit operation. It is a well-established fact that there are hundreds of coal-mine owners who do not fully appreciate what can be done by applying the methods of the "dirt-mover" to mining coal.

So we will look at the possibilities of coal stripping from the dirt-mover's standpoint—keeping in mind that the dirt-mover does not know everything about coal stripping, by any means. The experience of men raised from the cradle to coal mining is always a good thing to have when stripping. Here is one sad case of the lack of such experience by way of example:

Two young men happened to observe a wagon mine, which was located on the side of a hill near a peaceful little town in western Pennsylvania. The little mine was giving employment to a mere handful of workers, and the tonnage was small, less than 100 tons a day.

Forget to Consider the Coal

These two young men were old in dirt-moving experience, and they saw a fine chance for the application of steam shovel ideas to coal mining. So they told the operator of the little mine just what they thought of his methods, and how much better they could get out the fuel by stripping. Finally they secured a contract to excavate the coal, at a figure which was satisfactory to the coal man, and high enough to promise fat profits for them. They leased a shovel and brought it to the job. Everything went swimmingly.

About one month later the operation was at an end, and the two young men were dead broke. One of the would-be coal-stripping barons went to work for the man who had leased out the shovel, to repay the rental due. The savings of both men were gone.

Every detail had been carefully planned except the coal, which Mother Nature had unthinkingly left out of the hill. The two men had moved the steam shovel to the job and had made a fatal investment of their savings on the mere say-so of the inhabitants of the nearby town, who had confidently said: "Oh, that hill is just full of coal!" It would have cost them only about $25 to dig three or four test holes to verify this confidence of the natives. Three or four holes would have been sufficient to arouse their suspicions, as there was no coal in the hill except the little pocket which was being worked by the wagon mine and which would have "petered out" probably within a few months anyway.

I don't think any real coal operator would be likely to make such a mistake as that. He would know the tricks of coal beds, and he would have secured an accurate estimate of the quantity of coal present, its depth, and the thickness of overburden, before going ahead with stripping.

Most coal operators whom I have met are just about the exact opposite of those two young dirt-movers. They know pretty accurately what coal exists on their acreage, but they are too slow in starting to strip rather than too hasty. If every coal operator who really ought to start stripping (in justice to his own pocketbook and as a duty to the coal-hungry nation) should suddenly decide to do it, the manufacturers of steam shovels would be hopelessly behind in their orders for years to come.

There are literally hundreds of experienced coal operators who have idle coal on their acreage which could be stripped to excellent advantage. In most cases the total labor expense per ton on this coal would run about one-quarter of the labor cost per ton that is expended in mining the deeper coal on the same property. The operator has not attempted stripping, usually because of one or more of the following reasons:

1. He does not really believe the statements he has heard about the low cost of moving dirt and rock by steam shovel. Deep down in his heart he is scared by the amount of overburden to be handled—a yardage which perhaps would merely induce a dirt-moving man to take out his pencil and start figuring.

2. Possibly there is not a great quantity of coal near the surface, and the operator concludes that there is not enough strip coal to bother with—forgetting that coal mined by stripping is usually produced with a much larger margin of profit, and is consequently

LOADING THE STRIPPED COAL
Erie shovel owned by Cochran Bros., stripping and loading for the Youghiogheny Coal and Coke Co., Dawson, Penn.

equivalent financially to several times the tonnage of coal that lies deeper. And that's what he is really looking for, after all—the profits.

3. In many cases I have found that the coal operator has been frightened by accounts of enormous stripping operations, and has come to think of coal-stripping equipment as being represented by six figures. For instance, he is alarmed by visions of an enormous steam shovel costing about $200,000. Now, as matter of fact, steam shovels are available, as well as other equipment, to fit stripping operations of any size. Some coal operators are uncovering 200 to 300 tons of coal a day with a total plant investment of about $10,000, and are enjoying the most handsome profits they have ever made from coal. And it is a remarkable fact that on these smaller operations the cost per ton is almost as low as it is when stripping with an immense shovel.

I note that some coal men have received the mistaken impression that a large steam shovel will strip coal at a much lower unit cost than is possible with a

ANOTHER VIEW OF ERIE SHOVEL LOADING OUT STRIPPED COAL

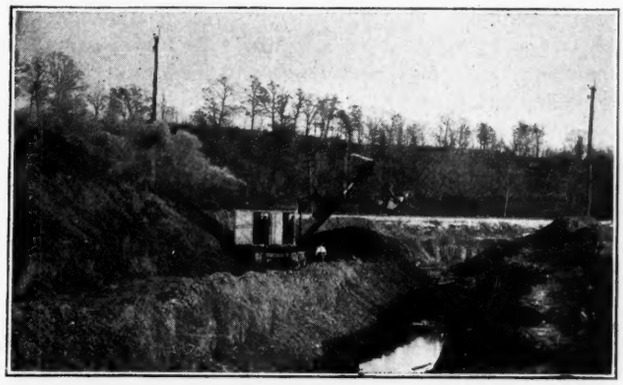
smaller shovel. In fact, one man who stands high in the councils of coal operators recently made the following remarks, among others, before an important gathering of coal brains:

"The size of the [stripping] proposition has a lot to do with it. With a large operation and a large acreage, you can buy expensive machinery, because your cost of machinery per ton of output will be very small; but in an operation of only a few acres, your actual cost of machinery is prohibitively high per ton."

Now, it does seem as if this might be true, but it isn't! The statement seems reasonable, and the man who made it may be pardoned for making a natural mistake—one which anyone except an experienced dirt-moving man would be likely to make.

This man quite possibly arrived at his faulty conclusion by timing one "swing" or cycle of a steam shovel from the cut to the dump and back; then dividing this time for one swing into the total time worked per day, to get the total number of dipperfuls, which he then multiplied by the capacity of the dipper. Very simple!

He overlooked a fact which is well known to steam-shovel men: that the cost of moving a steam shovel increases rapidly as the size of the shovel increases—



ERIE SHOVEL STRIPPING FOR THE ELSIE COAL CO. AT BRIDGEVILLE, PENN.

disproportionately so. At the very start, in getting the shovel to the work, a large machine must be shipped in parts and practically built on the job, while the small shovel comes from the factory on a railroad car and is ready for work a day or two after the arrival of the car.

The same comparison is forced upon the notice of the operator every time that the two shovels dig themselves out of work and have to move up for more. The large shovel loses disproportionately more time in moving up.

Another fact which should be borne in mind is that the depreciation of the large shovel must be figured as being much more rapid than that of a smaller shovel. The large shovel is a special machine that is adapted only for special conditions, and is useless for other work. At the conclusion of a stripping operation, the large shovel must be moved to the nearest heavy stripping location, no matter how distant or at whatever cost. The owner must either move the shovel to where it can be used or lose the capital invested in it.

The small shovel, on the other hand, can be sold practically anywhere, because such shovels are used by excavating and building contractors, brick yards, cement mills, crushed-stone producers, sand and gravel producers, etc., and have a ready market. If a small shovel receives the right kind of treatment, it can safely be depreciated slowly. The capital does not shrink to any great extent. To prove this for your own satisfaction, just try to buy, say, a ¾-yd. Erie shovel second-hand. You will find it impossible to procure one for less than 80 per cent. of the cost of a new machine!

These are some of the points in favor of the smaller shovel, but I do not for a moment want anyone to get the impression that I am arguing for the small steam shovel and against the large one. Each has its distinct field and neither can compete with the other. Each machine does work that the other could not do. I merely wish to emphasize the fact that the obvious advantages of the large shovel are just about counterbalanced by advantages of the small one, with the result that, strange as it may seem, the small machine will move 600 or 700 cu.yd. of earth per day at about the same cost per yard as the 3000 or 4000 cu.yd. moved by a monster shovel.

Getting back to the discussion of the coal operator's natural hesitancy about embarking on a stripping proposition, I admit that it is perfectly natural for the operator to be most inclined to follow the kind of mining that he knows best, and that he should be somewhat more cautious in starting a method of mining with

which he is not familiar. One coal man said to me: "I am making enough money now; why should I spoil my sleep by trying to make more? If anybody comes along and makes me a good proposition, I will let him strip on my acreage, but I won't undertake it myself."

Most mining men are more ambitious than that, especially since it has been demonstrated clearly just what kind of a fix the nation is in, and is going to be in, for coal.

There is no more difficulty about running a stripping operation in connection with underground mining than there is in managing an old mine and opening up a new one at the same time. In fact there is likely to be much less difficulty in operating the strip mine. There are some miners whose ambition nowadays seems to be to get a barrel of beer and lie under a tree—and go back to work only when the bank-roll is gone. But labor problems are hardly problems at all when you are stripping. The labor force is small, and you can afford to select high-grade responsible employees and pay them well. If you pay a good steam-shovel operator 50 per cent. more than the market rate for his labor, the effect may quite possibly be to lower your per-ton cost. In any event, the one-man pay-roll increase is sure to be insignificant when divided by the total tonnage. But it would be a different matter to raise the per-ton rate to miners to 150 per cent. of the prevailing rate.

In order to give some idea of what can be accomplished on a small stripping operation with a 20-ton shovel, carrying a ¾-cu.yd. dipper, I submit some figures that have been taken more or less at random. These estimates are too general to be of value in any particular case, still they are based upon actual averages and may be depended upon as conservative.

With a 3-ft. coal bed, underlying 12 ft. of overburden, the 20-ton shovel will uncover from 125 to 150 tons of coal per day. With a 4-ft. bed, under 10 ft. of overburden, the shovel will uncover from 175 to 200 tons a day. With a 6-ft. vein, and 8 ft. of overburden, the shovel will uncover 350 to 400 tons per day. Working on a 9-ft. coal bed, underlying 10 ft. of overburden, the shovel will uncover 450 tons of coal or more.

These figures are for a box cut, and are of course less favorable than the records which the shovel can make if digging into the side of a hill, and casting down the slope at the side. The estimates of the tonnage uncovered are based upon the shovel moving 600 cu.yd. of overburden a day, which is a conservative figure often considerably exceeded. With favorable conditions it would do better.

Of course, the foregoing figures can give only an approximate idea of the probable output. No real estimate can be made without considering the specific conditions which govern each particular case. The estimated cost of the shovel for a day's work will be about as follows:

Interest on shovel at 6 per cent., plus a depreciation of 20 per cent. (Note: As explained above, 20 per cent. depreciation is much greater than the actual loss of value. If you set apart even 10 per cent. to depreciate a good small shovel, and then take reasonable care of it, the shovel will in five years be valued on your books far below its actual market worth.)	$ 8.75
20 per cent. depreciation and 6 per cent. interest on cars, track, etc.	2.60
Shovel runner's wages per day	8.00
Wages of fireman and pitman at $4.50 per day each	9.00
Wages of handy man, for water and coal supplies	4.50
Incidental supplies per day	1.00
Total	$33.85

Now divide this figure, the cost of a day's operation of the shovel, by 200 tons, if that is the amount of coal uncovered, and the cost of stripping the coal by steam shovel is approximately $0.17 a ton. In case conditions were so favorable that 400 tons of coal per day could be uncovered with one ¾-yd. shovel, the cost per ton for stripping would be about $0.085 a ton.

This does not include the cost of loading the coal, which a shovel will do for about 15c. per ton, or perhaps less, in either case. This gives a total cost of 32c. a ton for stripping the coal and loading it on the cars, when 200 tons per day are uncovered; or 24c. a ton for stripping and loading, when 400 tons are uncovered. To this must be added at the start the cost of hauling away earth to begin the operation.

These are figures based upon actual work, and may be relied upon. In adding the wages of management to these costs, it is justifiable to estimate not more than the unit charge for management in deep-seam mining; and this charge should, if anything, be still less after the operator is reasonably experienced in stripping work.

It is not necessary for me to comment on the comparison that the coal operator will involuntarily make between the cost per ton when stripping and loading by steam shovel, and what it is costing him to produce coal by deep-mining methods. Under present conditions, the moral is almost too obvious to recite. With the nation's double shortage (of coal and of labor) it is a patriotic duty for the coal-mine operator to strip coal, if he has any that can advantageously be produced by this method. It is a clear case of getting three times the tonnage per man employed—or better. If there are stripping possibilities on your property, now is the time that they ought to be realized.

SHOWS THE PORTABILITY OF THE SHOVEL
A 20-ton Erie shovel climbing up the side of a mountain, along the bed of a creek, to get to the coal-stripping operation of the Elkhorn-Piney Coal Mining Co., Powellton, W. Va.

In closing, I wish to make it clear that this article is not interested testimony, designed to promote the sale of steam shovels. Nowadays the manufacturer of steam shovels has a great deal more trouble building them than selling them. If these few remarks should lead anyone to investigate and finally buy a steam shovel, he will probably find that it will be necessary for the shovel manufacturer to divert a machine from some less essential industry, and sell it to him in preference because of the vital importance of *more coal* at this time, when the country is already facing a shortage.

Maximum Production for Humanity's Sake

By H. K. PORTER
New York City

SYNOPSIS—*Maximum production is necessary during the present war, but this is unobtainable unless efficient apparatus is provided. Locomotive haulage, both trolley and storage battery, has done much to increase coal production. Easy running cars would doubtless do vastly more.*

IT HAS been aptly said that the titanic conflict now being waged across the water is no longer a struggle of the people of a number of nations against the people of a number of other nations, but rather it is a struggle of nations against nations—the struggle of the allied nations, with their liberal democratic governments, against the corrupt military rulers of our enemies.

Of the ultimate victory of the Allies and the vindication of the principles for which they are fighting there is little doubt in the minds of clear-thinking men, and the vast preparations which are being made by our country go to further insure the complete success of the allied cause and the ultimate victory of humanity.

All industry in the United States must bend its every endeavor toward producing the greatest volume of materials, both raw and finished, with the greatest possible economy and efficiency.

It is not possible that maximum production for humanity's sake will be realized in every instance, but to insure maximum output in all of our industries it is necessary that there be a closer coöperation between employer and employee. This desired harmony of effort can only be realized through a closer understanding of the problems of the employees, the men at the lathes, in the mines, at their work—wherever they happen to be.

Workers Now Better Understood

In many of our industrial establishments the laboring man has become better understood through the medium of welfare work and kindred activities than in the years gone by, and his standard as a working man—as a producer—has been raised by a goodly percentage. Many of the foreign-born have had instilled into them the love for our country and its ideals, and they have come to love the industry in which they are working.

It can be admitted, however, by those of us who are familiar with conditions in and about the mining operations, that many operators have failed to realize that through a study of their miners, by helping them to raise their standard of living, by more acutely realizing their thoughts, aims and ideals, more efficient and more willing work would be performed by the foreign-born miners, who through birth are temperamentally different from us in almost every way.

My sentiments were accurately expressed by an editorial in *Coal Age* which said: "It may be that the foreigner is the man of the stricken barn, the blighted field and the crippled horse, but no good will come of reminding him of his misfortune. In the language of the streets, 'have a heart.' What a foreigner wants more than your praise of America or your denunciation of his Fatherland or Motherland is the grip of your hand, the tremor of your voice and the exultation of service which your patriotism evokes."

The coal-mining industry should adopt this as its motto and as its guide, because in it lies the possibility of maximum production for humanity's sake.

Most of us will admit that we can instill the desire to work from patriotic motives in the majority of our foreign-born miners. And if through a clearer understanding of their aims and ideals we can accomplish our avowed purpose, it then becomes necessary to give them the proper tools to work with the economical tools, to remove as much of the drudgery from their toil as we possibly can. No man is a willing worker if his energy is taxed to the limit, if his energies are drained to such an extent that when he arises in the morning the exhaustion of the previous day has not been removed by a night of rest.

Progress Made by Introducing Machinery

We know that coal-cutting machinery has been responsible for increased production, because it enables the men to do their work faster and in a pleasanter manner, and because it permits them to earn more per day.

We know that the electrification of the main haulage provides a better supply of empty cars for the miner and has helped to increase production greatly. The use of storage-battery locomotives for gathering purposes also has, and is, and will have, a tremendous effect toward a more willing and more economical production of coal.

The elimination of the mule for gathering service was a humane step, both for the mule and for the men working in the mines. It has undoubtedly worked toward a greater production.

Almost any mining man who has studied mine labor problems will tell you that more grumbling, discontent and layoffs have developed through the dislike of handling cars than from probably any other cause originating within the mines. Of course, paid disturbers have hatched up and magnified imaginary troubles, in many instances, which have also upset the routine of coal production. But the handling of mine cars by the miners has always been a source of annoyance and friction.

Imagine yourself struggling with a stiff-running mine car, trying to push it over irregular tracks or a wooden emergency track. Could you within three-quarters of an hour afterward devote yourself to your work with your best energy? How many of your men have ever been laid up for two or three days by a sprained back? Your company doctor can cite numerous instances where a disabled miner has attributed his injury to attempting to move a stiff-running mine car. It is positively back-breaking.

Most of the people who have a knowledge of coal mining and who are actually engaged in the production of coal will say positively that their cars are placed for the miners under all circumstances. They will assert

that cars are rarely, if ever, handled manually; but in many instances, and in fact in the majority of cases, they are considering ideal and not actual conditions. Little as they want to believe it, thousands and tens of thousands of loaded and empty mine cars are moved by the labor which should be loading coal, every day that our mines are working.

The miner and his "buddy" must push the loaded car to the parting and push the empty car back into the room. The men must move the stiff-running mine cars at the shaft bottom and they must push them on the tipple. Every second's delay in the handling of one mine car, when multiplied by one thousand or by ten thousand, means an enormous waste of time throughout a complete working day.

It would not be so bad if one man could handle the ordinary stiff-running car, but now that mine cars are getting larger in size, so that they hold from 4 to 5½ tons of coal, they are heavy to handle and in many instances it takes three or four men (we have heard of instances where it took five men) to push some of the heavy mine cars. If you figure the time of the extra men needed, you cannot but realize that increased production for humanity's sake is being seriously crippled by the lack of proper cars in which to haul the coal.

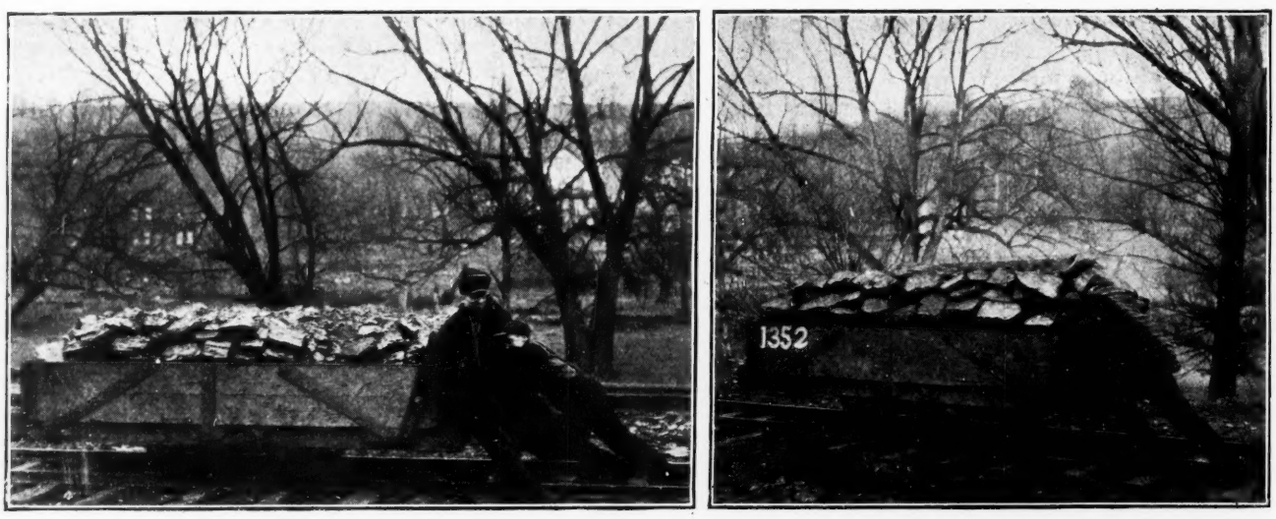
In one of the accompanying photographs three men are seen pushing a loaded mine car. This car weighed about 4¼ tons and was equipped with ordinary plain bearings—back-breakers. In the other photograph is shown a car of the same weight, which is being pushed by one man—and this man was able to start the car from rest without assistance and propel it with ease.

The track where the photographs were taken was approximately level, and while it might take two men to push the roller-bearing car up a slight incline, it certainly would have taken four or five men to push the plain-bearing loaded car up the same slope. The advantages of the antifriction bearing are especially potent in the anthracite region, where storage-battery locomotives for gathering are not as numerous as in the bituminous section, and where a severe shortage of mules exists at the present time.

This means that in the anthracite region a great many more cars must be pushed by hand this year than last year. The same is true beyond the question of a doubt in connection with a great many of the bituminous mines, of which we have no definite record.

The photographs which are here shown were taken before an assemblage of about 30 prominent mining men and was sufficient proof to them of the desirability of using roller-bearing mine cars. These are easy on the men, as compared to the plain-bearing cars which make the labor of pushing extremely tiresome.

Then again, roller-bearing mine cars need to be lubricated but once every three or four months as compared to the every-day lubrication of those with plain bearings. In fact, a prominent operator of western Pennsylvania recently stated that the proper time to oil a plain-bearing mine-car wheel is every time you look at it, because every time you look at it it needs to be oiled. Consequently, the labor involved in oiling the plain-bearing car is wasted, because if roller-bearing mine cars are utilized the services of the oiler can be employed in a more profitable manner. In other words, the use of roller bearings releases another man for work in the actual loading of coal.



THREE MEN NEEDED TO PUSH A LOADED MINE CAR EQUIPPED WITH ORDINARY PLAIN BEARINGS. THE SAME LOAD, IN A MINE CAR WITH ROLLER BEARINGS, WAS PUSHED WITH EASE BY ONE MAN

It seems rather far-fetched to speak of roller-bearing mine cars and maximum production for humanity's sake in the same breath, but the operators who are using roller-bearing cars know that the two are synonymous. Many of them will tell you that their miners fight for the easy-running mine cars. They well know that if they secure the easily pushed car their work is going to be lessened. They will then not be compelled to break their backs attempting to produce the coal which is going to win the war for us and our allies, and which is going to help the miners to become better citizens. Simultaneously, the coal operators through an increased production will be enabled to expend greater efforts in making true-blue Americans out of the nomadic foreigners that now produce the Nation's fuel.

Only when combustion is very poor, owing to inadequate space above the fuel bed and rapid cooling of the gases, are hydrocarbons likely to be found in flue gas.—*Bureau of Mines Bulletin No. 135.*

Reliable Gears

By C. J. BROWN
Pittsburgh, Penn.

SYNOPSIS—*A maximum production of fuel is highly necessary at this time. All elements of the equipment upon which the production of coal depends should be selected with care. Gears, in order to be reliable in use, should be both hard and tough. These qualities are brought to a maximum by heat treating the steel of which the gear is made.*

CONTINUOUS operation in any essential activity is demanded and absolutely necessary at this time. The needs of our Government make this imperative; especially is this true in the coal-mining field. To produce the coal necessary every sinew must be stretched to the breaking point; every feature of operation must be carefully studied and acted upon in order to eliminate curtailment of output; there must not be any delays due to breakages or other avoidable causes; mines must produce their maximum tonnage continuously.

Gearing represents an important item in the chain of equipment, the parts and supplies of which, when linked together, go far toward making continuous operation possible; and too much attention cannot be given to its selection and care. This is not only true insofar as locomotives are concerned, where much time is required to replace broken gears or pinions, resulting in serious delays to haulage systems and consequent loss of time spent by mechanical men in making repairs, who might be otherwise engaged, but it is also true of all other gearing that is used in and about mining operations.

Case Hardening Not Ideal Treatment

So far as gearing is concerned, the delays illustrated can only be successfully avoided by using a superior grade of material. This is a practice that the R. D. Nuttall Co. has been endeavoring to have the mine operators follow, and with a considerable measure of success. This company has advocated heat-treated gearing for mine service for a number of years, correctly claiming that it is false economy to use anything else.

Case hardening was the first step, but although it proved to be quite a success as compared with untreated gearing, it was not the ideal treatment for mine service because the glass-hard surface with soft core or center, while it was ideal from the viewpoint of wear alone, did not have the necessary toughness to withstand the severe shocks and stresses to which mine gearing of all descriptions is continually subjected. Consequently, earnest and extensive research and experimental work were carried on by this firm to perfect a treatment better adapted to mine conditions.

There are two important points to be considered by the mine operator when deciding upon the type of gearing best suited to his purpose, especially when his locomotive gearing is the issue. These are hardness and toughness. One is just as important as the other. It is not wise to select a gear or pinion with great surface hardness and soft core, capable of giving long service if steady and continual wear were the only consideration, but unable to withstand breakage due to the many stresses and shocks incidental to mine service. Neither should there be selected gearing tough to the point of successfully eliminating breakage caused by frequent starting and stopping, inexperienced motormen, uneven and crooked haulage roads, etc., but without necessary surface hardness to give long service from the viewpoint of wear.

Hardness and Toughness Ideal Combination

The ideal is a combination of the two good qualities, hardness and toughness, and this combination unquestionably has been obtained in specially heat-treated gearing; in fact, the principle of the treatment has been solely founded upon these two qualities. The treatment referred to is well known to the larger number of mine operators and is fast becoming the standard—namely, Nuttall BP grade when applied to forged steel and NP grade when applied to cast steel.

To better appreciate the benefits to be derived from the installation of treated gearing—gearing that will show results at the end of the year—the following record should be carefully noted:

A Westinghouse electric mine locomotive No. 38581, equipped with 35-hp. motor, operating over a 5000-ft. haulage road with two maximum grades of 2½ per cent., around 75 deg. curves, and hauling full trips up grade, covered 4000 miles, and hauled 100,000 tons of coal per year. A BP grade pinion in this service gave 100 per cent. results for a period of five years and was not entirely worn out when removed. It hauled during this period 500,000 tons of coal under heavy service conditions. In this same service an oil-treated pinion wore out in six months; it hauled 50,000 tons of coal. In five years ten oil-treated pinions would have been necessary, resulting in ten interruptions of service. Allowing one-half day for each interruption, this would mean a reduction in output of 3000 tons. A case-hardened pinion broke in 1½ years; it hauled 150,000 tons of coal; but the vital point is that it broke. The broken teeth wedged in the gear and locked the wheels. Not only was the locomotive disabled, but the haulage

TABLE OF COMPARATIVE DATA

Grade	Material	Carbon	Ultimate Strength	Elastic Limit	Elongation in 2 In.	Reduction of Area	Surface Hardness Brinell	Relative Life	Relative Cost
CS	Cast steel (Untreated)	Medium	60,000 to 75,000	30,000 to 40,000	18–22%	25–35%	121–155	$1.00	$1.00
BP	Forged steel	Medium	115,000 to 130,000	80,000 to 90,000	8–12%	25–35%	418–555	4.00	1.30
NP	Cast steel	Medium	110,000 to 120,000	75,000 to 85,000	6–10%	20–25%	360–512	3.00	1.20

road was blocked for two hours, which alone meant a reduction of nearly one-half day in production. It will not be necessary to go into detail with the mine operator to illustrate the saving in ultimate cost effected by having in service the type of pinion whose performance is first cited.

The table of comparative data, shown on the preceding page, gives interesting and valuable detail information for anyone interested in the subject of gears and gearing.

It will be noted that the tensile strength of the BP and NP gear from the test piece is not in proportion to the tensile strength corresponding to the Brinell hardness. This is due to the test piece being a measure of the physical properties at the center of the tooth, while the Brinell test gives physical properties of the gear at the surface of the tooth. The equivalent tensile strength as shown by the Brinell tests of the two grades is as follows:

Grade	Brinell Hardness	Equivalent Tensile Strength
NP	360–512	178,000 to 253,000
BP	418–555	204,100 to 273,300

It can readily be seen that the great resistance to fracture of these grades is due to this high strength of the outer fibers of the steel. This hardness grades off very gradually in a straight line ratio to the center of the tooth.

Erico Portable Bonding and Welding Apparatus

By W. E. Huber
Cleveland, Ohio

The electrical distribution of energy and its attendant losses is one phase of the momentous problem of coal. The heavy current flow of the electric railway where the track rails serve as part of the circuit may be a source of loss against which conservation tactics may well be employed. Better maintenance of track than has obtained in the past cannot be expected, therefore the return circuit of the electric railway is a field of increasing interest, for progress in method and appliance.

The old method of applying a welded copper bond to a rail joint made use of a bonding car which carried a pair of resistance welding clamps with a suitable motor-generator and low-voltage transformer. In the early days of electric traction when the problem was the bonding of new track, the bonding car left little to be desired, and under the maintenance conditions of some roads it still meets all of the requirements that have developed. It is a work car as well as a first-class bonding apparatus.

The problem of a small portable apparatus which would comprise all of the welding functions of the bonding car was studied from the beginning; constant effort and the aid of developments along other lines has brought the solution in the Erico portable welding apparatus, which weighs about 200 pounds. It comprises in its functions all those of the three-ton bonding car and in addition, when it is not in use for installing bonds, it may be transformed into an arc welding set for work either in shop or along track. The complete apparatus for rail bonding on a 600-volt line consists of a welder, a rheostat and a grinder for cleaning the rail. Fig. 1 shows the apparatus adapted for a 250-volt line, in which case the rheostat, having a lesser demand for radiating capacity, is quite small and is transported as a hand tool weighing about 25 pounds. The evolution from bonding car to portable welding apparatus for a 250-volt line thus brings the total weight of apparatus from three tons to a trifle over 100 pounds Fig. 2 shows the 250-volt rheostat as an arc welding set.

FIG. 1. WELDING A RAIL WITH THE ELECTRIC WELDER

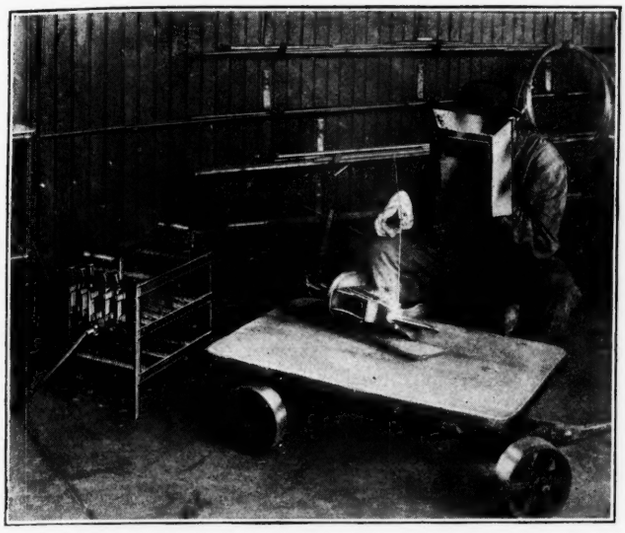


FIG. 2. MAKING REPAIRS IN THE SHOP

The original bonding car makes use of heat generated by the flow of a heavy, low-voltage current across the terminal of the bond, at right angles to the rail; the carbon electrode of the welding clamp presses the bond terminal against the rail until the heat generated by the current from the transformer effects the welded union of bond terminal and rail. The portable welder also presses the bond terminal against the rail by means of an electrode and, in so far as the heat action and welding of the terminal is concerned, is similar in its action to the bonding car; the full intensity of heat and consequently the completed operation is obtained more quickly with the portable apparatus than with the car. The electrode of the portable welder which engages the bond terminal is not the solid carbon block used with the bonding-car type of electric welding apparatus, but consists of a hollow composite box with a graphite contact against the bond terminal; within this small chamber the heat is generated at the terrific intensity of the arc, to be conducted through the thickness of the graphite plate and diffused by the graphite medium into an ideal, uniformly incandescent welding electrode at the contact with the bond. The heating medium of the portable welder is a form of inclosed magnetic arc, the negative electrode of which is the graphite plate which contacts with the bond terminal. The remarkable part of the apparatus is the effect of the magnetic field within which the arc is drawn. The effect of the field upon the arc flames may be likened to that of an air blast applied to a gas flame, the analogy holding as to the increased quantity and intensity of heat, due to a higher voltage drop, and as to the vigor of the action, which is accompanied by an explosive vibrating sound. The magnetic field of the welder is the result of the rectangular solenoid which forms the body of the welder, the axis of which is the center line of the arc.

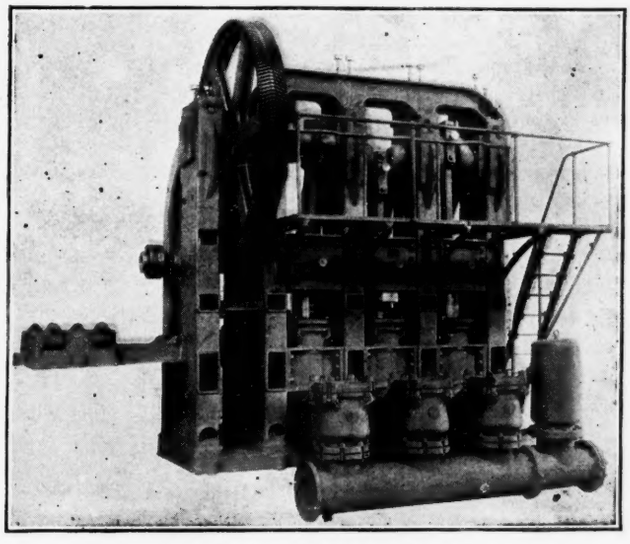
The welder is supported in operating position at two points on one rail and by a chain and hook reaching over to the other rail. To disengage the apparatus, merely pick it up. Adjustment of the contact between the negative electrode and the bond terminal is obtained by varying the length of the chain, which changes the inclination of the apparatus, and by the hand wheel which raises or lowers the body of the welder. For a given rail these adjustments need not be changed. Pressure of the electrode or front plate of the furnace box is secured by a pressure screw.

The inclosed magnetic arc of the portable welder has a drop of about 125 volts and requires about 100 amp. when in normal operation. An open arc pencil has a drop of from 20 to 50 volts. In case of operating either the welder as in Fig. 1 or the open arc pencil as in Fig. 2, the rheostat is interposed between the operation and the trolley wire. The rheostat comprises a number of unit resistance paths, each of a common current capacity under the same potential source. The operator of the welder may therefore at all times secure the most efficient amperage for his apparatus regardless of any drop in the line voltage, by adding to the number of current paths of the rheostat in operation; likewise the arc welder may keep his current up. The current capacity of the rheostat is thus increased until all of the current paths are in operation. The apparatus as a whole is one of the most timely improvements to assist in meeting the great maintenance difficulties of the present time. The bonding feature of the apparatus alone gives it a prominent place in the list of up-to-date appliances, while the arc welding feature is coming more and more to be first thought with the emergency man.

Modern Mine Pump

The accompanying illustration shows a recent development of the vertical triplex plunger pump for mine use. Mine water, as a general rule, is acidulous and calls for a pump the cast iron of which is protected. The water end of this Scranton mine pump is lined with wood, lead and bronze, so that not one square inch of cast iron is exposed to the action of the water.

A mine pump to be serviceable must be simple, yet rugged in construction. It must be sectionalized as far as possible and all parts be readily accessible. The pump shown has a five-bearing crankshaft with adjustable wedges located on the top half of the bearing. Since on a single-acting pump the thrust is on the top half of the journal box, any necessary adjustment can be readily made without throwing the crankshaft out of alignment. The crank- and wristpin brasses and



A WOOD LINED TRIPLEX PUMP

crosshead shoes are made of a special bearing bronze and provided with adjustment for taking up wear.

Pumps of this type are usually driven by single-reduction herringbone gears and direct-connected by flexible coupling to the motor. The water valves, which are the most important part of a mine pump, must be especially designed for each individual case. The water velocity is held down to 3 ft. per second, which insures a quiet-operating and long-lasting valve.

The valve seats are of the double-ported type and flanged, facilitating easy removal for refacing. This is essential, as the water handled by most mine pumps is gritty and the faces of the seats become scored. The valves up to 600 ft. vertical lift are made of rubber and inserted in a bronze plate which extends down and around the periphery of the valve, holding it rigidly in place. Rivets, studs or tap bolts should not be used to hold a rubber valve to its plate, as they are quickly affected by the acid water and result in considerable trouble.

The valve stem and spring are of phosphor bronze. The spring is incased in a bronze cage, as a protection against the scouring action of the water. The valves, seats, chambers, and all parts where possible, are made interchangeable to eliminate the necessity of carrying a large stock of repairs.

Mine pumps and their driving motors should in all cases be mounted on heavy cast-iron baseplates, securely tied together. This arrangement facilitates the erection of the pump and guarantees a permanent installation. Triplex pumps of the foregoing design have developed an efficiency of 85 per cent. for the pump alone.

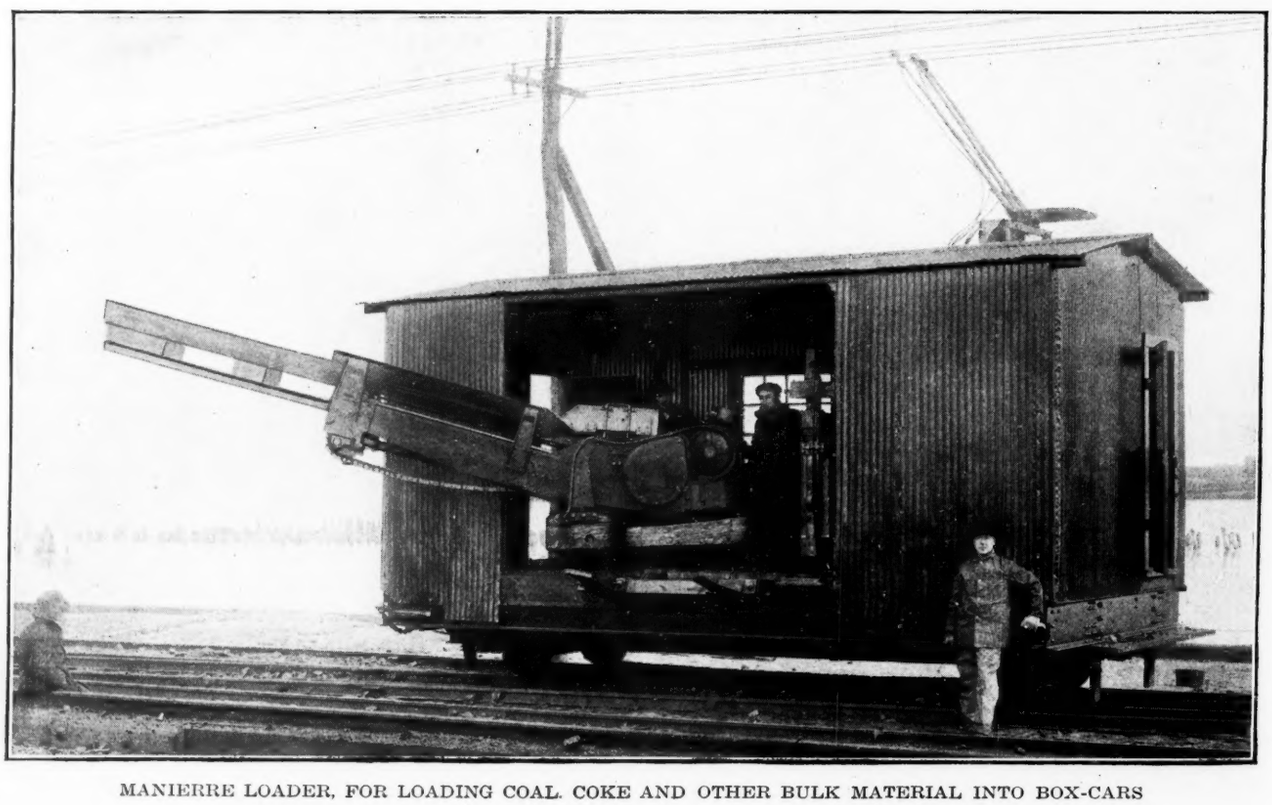
Box-Car Loader in the Present Emergency

By ELLIS B. USHER
Milwaukee, Wis.

THE Government's warning that 75,000,000 to 78,000,000 tons more coal will be needed in war industries this season than last, and that this amount must be had by increased output or drastic curtailment in nonessential industries and domestic uses, leaves no chance to escape the conclusion that, with known labor shortage, steadily growing worse, all the mechanical aid available to mining must be utilized. Machines that will increase production at the mines, that will handle and move the product more expeditiously and at the same time economize labor, must be put to work.

Machines of proved efficiency naturally should be the first to be chosen. The mechanical box-car loader built by the Manierre Engineering and Machinery Co., of Milwaukee, Wis., although one of the newer loaders for coal and coke, has during its nine years' career taken a place that justifies calling attention to it as an instrument that may greatly assist in winning the war. The Manierre loader was the first machine to load coal, coke and other bulk material into box-cars on the conveyor principle without throwing it, and therefore practically without breakage.

All the different types of this loader are built on the same principle, and consist of a conveyor frame



MANIERRE LOADER, FOR LOADING COAL, COKE AND OTHER BULK MATERIAL INTO BOX-CARS

carrying the motor and conveyor balanced in a fork supported on the end of a box-section, cast-steel arm, which is journaled on another similar arm, in turn carried by brackets upon a post. This post is securely attached to a monolithic foundation or other adequate support. The arms are journaled on ball and roller bearings and move with great freedom. The loader can thus be placed in the car with great facility since it is without complicated mechanism. The balanced feature of the conveyor frame makes it easy for the operator to tip the conveyor to the floor when starting to load, thus avoiding throwing and breakage. This is accomplished by a worm gear at the rear end of the machine.

The chutes, which are of several varieties to meet different conditions of installation, have the common characteristic of a universal motion at the delivery end, where attachment is made to the loader. This enables the chute to follow the loader, in all positions, as the coal is distributed throughout the length of the car.

Any of these loaders (there are seven standard types) can be built stationary or portable. They all will load box-cars on either side, on two tracks, or the machine may be placed on the opposite side of the car from that on which the chute enters. Special conditions are easily met by construction adapted to them.

Space does not permit more detailed analysis of the mechanical construction of this machine or the many engineering problems that it has successfully solved, but results accomplished are vital at this time and testimony to such accomplishments is easily to be had.

One of the leading dock companies of the Great Lakes says: "One man operating this loader in box-cars takes the place of four men trimming by hand and does the same work in one-fifteenth of the time that the four men will do it. With this loader we frequently load run-of-pile bituminous coal at the rate of one car every five minutes or twelve cars in an hour, while it is good work for four trimmers to load a 40-ton car in one hour and 15 minutes."

A large byproduct coke shipper gives testimony as follows: "The cost of loading per ton on a type 'C,' 16-in. machine is $0.0235, and on the 24-in. machine $0.03. At the same labor rates the cost of loading box-cars by hand would be approximately 23c. per ton."

A large mine owner in Illinois, who has just put in a machine at a second mine, tells the manufacturers that the first loader "took the place of six men loading by hand and in addition increased the number of box-cars loaded 400 per cent. in eight hours' work."

From coal mines and large dealers in all the fields in this country and Canada comes the cry of distress as to labor and car shortage. Nothing therefore is more important to the Government and to the public than to utilize every successful and proved mechanical device available. The Manierre loader is in this class, and the manufacturers looking farther ahead than many other concerns have prepared with a supply of standard machines and motors on hand. This has been done in order to meet rush orders with a promptitude that will in itself be a public service.

Back up those who are offering their all—buy War Savings Stamps.

When you buy War Savings Stamps you do not give—you receive.

Safety Powder Flasks and Fire Pails

A consideration of great interest to those engaged in coal production is the large number of men employed in the industry that are subject to draft. The number amounts to roughly one-sixth of all the men employed. The labor supply is limited, and the gap made in the ranks of the coal miners by the needs of the army can be filled, if at all, only with great difficulty. Under such circumstances the questions of labor efficiency and conservation become even more important than in normal times.

As a result even greater care than ever should be exercised in accident prevention, and only such equipment should be employed as has demonstrated its econ-

SAFETY POWDER FLASK

omy and durability. "Fibrotta" powder flasks or jacks as manufactured by Cordley & Hayes, of New York, come under this category.

These flasks are entirely non-metallic and are consequently non-conductors of electricity. An electrical conductor coming in contact with the exterior of the flask will thus have no effect upon the contents and will not cause an explosion. This safety feature has been recognized by many mine inspectors throughout the country.

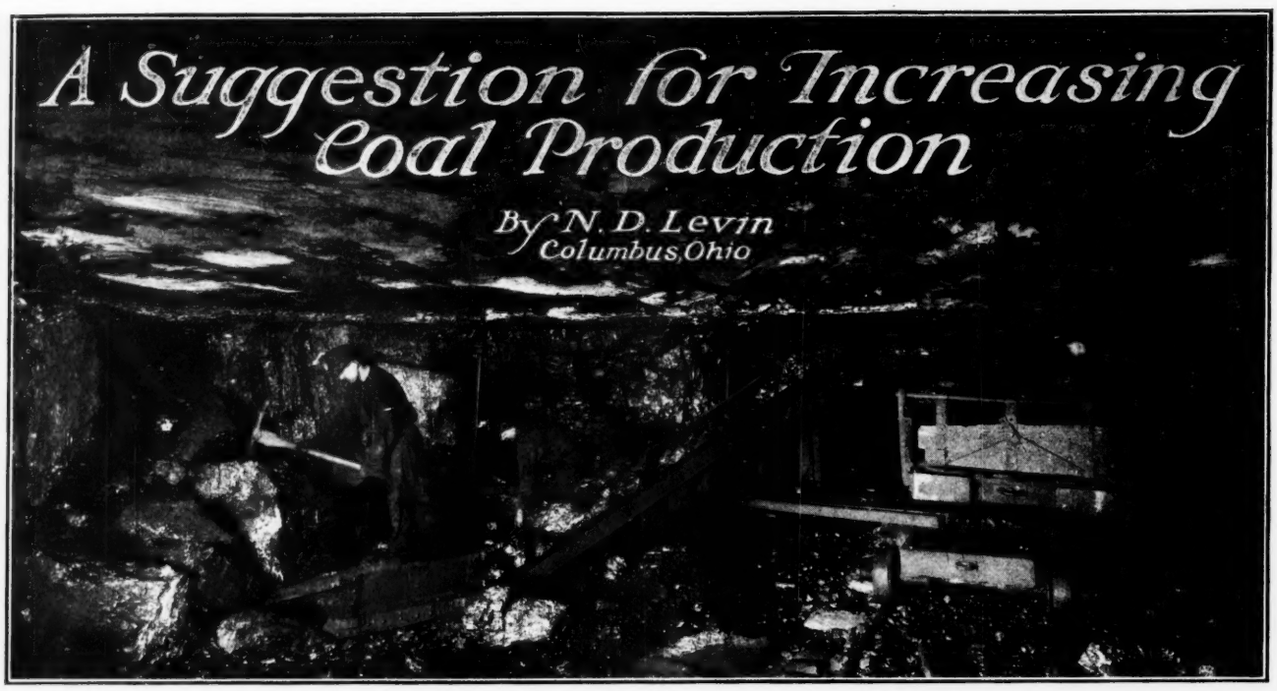
These powder flasks are made in one piece under heavy hydraulic pressure. They are consequently seamless and jointless. The surface is so treated chemically as to make it hard and glasslike and impervious to moisture. The cork stopper is attached to the flash by means of a strong linen cord, thus preventing the loss of the cork.

Flasks of this kind are economical because of their long life, which exceeds that of many of the metal containers the price of which is high and still rising. It is claimed by the makers that Fibrotta flasks will not swell, rust, warp, leak or dent out of shape. The material of which they are constructed is hard and strong and will stand rough usage. In addition it is a non-conductor of heat as well as electricity. As a result of all this these flasks are light and easy to handle and will not sweat on the inside and injure the contents.

The manufacturers of these flasks also made funnels for filling them, as well as fire pails of the same material. Some of the latter have been in continuous use for many years without serious deterioration. Such pails are not affected by anti-freeze solutions and when properly labeled are approved by the Underwriters' Laboratories and recognized by all the fire insurance companies.

A Suggestion for Increasing Coal Production

By N. D. Levin
Columbus, Ohio



SYNOPSIS—*As the demand for coal grows stronger, the man power available for its production will doubtless become less. To offset this shortage various means have been proposed, but none appear to possess greater merit than the employment of light, easily portable loading conveyors, which perform the most arduous work the loader has to do. In practice these have made possible an increased production per man employed.*

AT THE present time the production of coal is limited by the ability of the railroads to handle the output of the mines. The time will come, however, when the transportation companies will have sufficient equipment and be in position to handle and distribute the coal produced. The question will then be, Will the mines be able to maintain, or rather increase, the tonnage? One or two more drafts will, in certain localities, reduce the man power to such an extent that its lack will be felt keenly.

The demand for coal next winter will be enormous; it is claimed that it requires 16,000 tons of coal to build an 8000-ton ship, and 80 lb. of coal to produce a single 3-in. shell. We must build hundreds of these ships and millions of shells. At the same time every effort should be made to keep the industries of normal times going so far as possible.

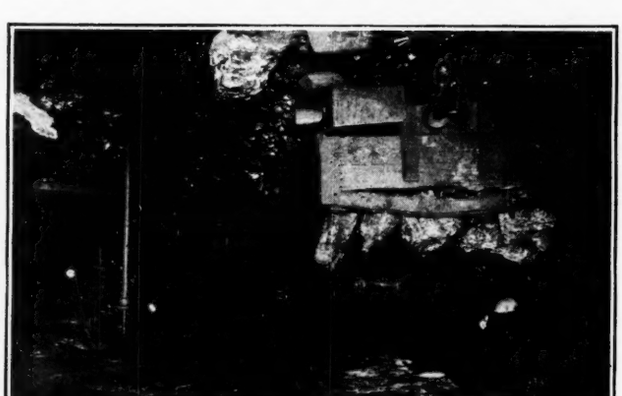
Several remedies have been suggested; for instance, to exempt miners from military duty. But this would hardly seem practicable, as there are many other industries—railroads, steel mills, iron mines, ship-building yards, etc.—that would have equally good reasons for claiming exemptions. It has also been suggested to allow boys to work with relatives in the coal mines; also to employ women for work underground. The general opinion is, however, that such means should not be resorted to except in case of extreme necessity, and we trust that the war will be won before it becomes necessary to send our women and children into the coal mines.

Another suggestion is to lengthen the working day from 8 to 10 hours. This would not give the desired result; England lengthened the working hours during the war without deriving any benefit therefrom. The object of this article is to make a suggestion that may be helpful.

Despite the fact that most modern coal mines are equipped with machinery especially adapted to undercutting and hauling a maximum output, and each operation necessary to obtain such output has been carefully studied and special machinery designed therefor, primitive methods of loading the coal still prevail to a large extent.

Efficient and reliable apparatus is available for undercutting the coal bed; holes for the insertion of the blasting charge are drilled either by the use of electric or compressed-air apparatus; explosives have been brought to a high state of perfection; electric gathering and haulage locomotives have practically replaced animal power, yet the coal is still almost universally shoveled into the mine cars by hand.

Experiments have been made during the last two



THE LOADER AT WORK

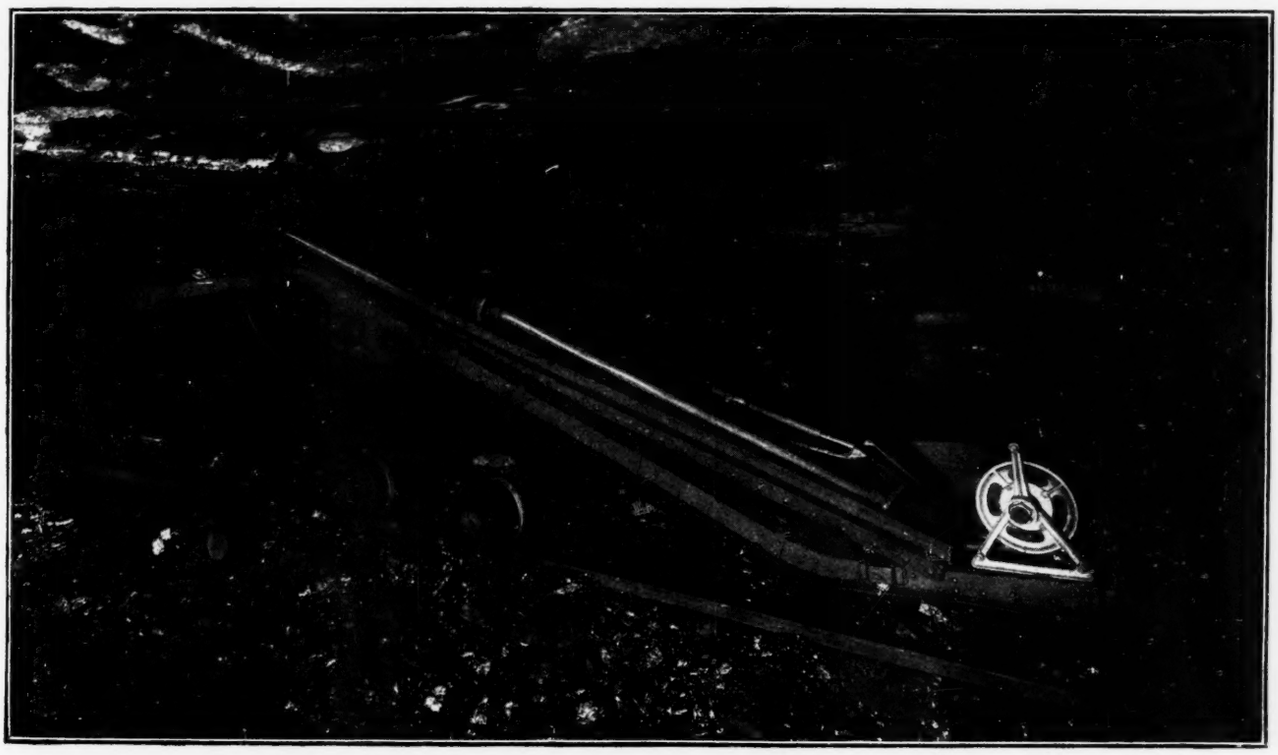
years with a small conveyor, such as shown in the accompanying illustrations. It has been found that two men will average 50 to 80 tons per shift using this loader. It is obvious that less labor is required to shovel the coal onto the end of the conveyor (which is only about 6 in. high) than to shovel it into a car 3 or 4 ft. in height. A second handling of the coal is unnecessary, as the conveyor can be so located in a room as to reach the far corners. Where the coal is not shot down onto the floor, a considerable quantity of it can be pulled down from the face in such a manner as to cause it to fall onto the conveyor. In certain instances an apron is used on each side of the conveyor. This is not shown in any of the illustrations. Coal falling upon this apron can be readily pushed into the conveyor.

In states where the shooting of the coal is performed during working hours, the conveyor can be set so that the coal is shot down onto its outer end and onto the aprons. The conveyor is so light that it can be handled and placed in position by one man if necessary. The truck is equipped with roller-bearing wheels, and can be pushed from one place to another by two men unless the grades are heavy.

My reason for recommending a light, inexpensive machine of this kind is that delays will not seriously affect the usefulness of the machine. It is evident that if the conveyor is compelled to remain idle, say 15 minutes, waiting for a car, the men will have work to do in the meantime; they may pull down coal from the face, or load up the front end and aprons so as to have a carload ready without any shoveling, as soon as an empty is secured; or they may take a rest, which under many circumstances can hardly be considered a waste of time.

A man shoveling coal into a car is desperately inefficient from the mechanical standpoint. In order to lift a shovelful of coal weighing, say 20 lb., through a distance of, say 3½ ft., he must lift his entire body through a certain distance while he raises his trunk (from the hips upward) from approximately a horizontal to a vertical position. The total muscular energy thus expended is large, while the portion of it consumed in useful work is small.

By the use of the conveyor it has been demonstrated that an increase in output can be secured, employing the same number of men. If the men can double the number of cars loaded per shift by the use of this machine, it is obvious that each place will be loaded out in one-half the time required by the use of shovels only, and therefore each place can be cut and loaded out twice as often. This is equivalent to doubling the output with the same number of loaders, or from the same territory the same output can be obtained with



THE LOADING MACHINE UPON ITS TRUCK READY TO BE MOVED

less men and no development work will be necessary for some time to come.

Conveyors of this kind can be quickly produced in large quantities, thus securing an early increase in tonnage, much earlier than could be secured by opening new territory. What the country needs is output, and for quickest results at comparatively small expense, I know of no way to equal the use of this small conveyor equipment.

It is easy to understand that two molecules of CO can find one molecule of oxygen in the furnace gases much more quickly than one molecule of soot can find 12 molecules of oxygen. Therefore, simple gases, like CO and H_2 burn quickly in the furnace, because they more readily find the small amount of oxygen needed for their combustion; whereas the more complex combustible like soot burns slowly.

Efficient Haulage Methods

By PAUL TEAS
Cleveland, Ohio

SYNOPSIS—*It is useless for the miners to dig coal unless it can be transported quickly and promptly to the tipple. Mine transportation is the "neck of the bottle" that must be kept open if coal is to be shipped. Gasoline-locomotive haulage is proving efficient for this purpose.*

EVERY new responsibility created by the war taps a new source of energy that the American people had scarcely dreamed of possessing. The number of men from the coal-mining industry who have been and will be called to the colors leaves a serious gap—but the situation can and will be met. America's "will to do" is more than equal to the demand.

The problem of getting coal from the workings to the tipple is as important as that of digging it. The miners would soon bury themselves if the coal were allowed to pile up behind them. A well-organized haulage system is the vital connecting link between the mine face and the railroad—the "neck of the bottle" that must be kept uncorked if the mine is to work to capacity, and if the owners are to do their part toward supplying the world shortage of fuel.

It took the prod of war to really "show up" animal haulage. The flop-eared, perverse mule has been associated with coal hauling for so long that some people had almost come to think that mules grew in mines, like mushrooms.

But when the war came, mule prices went up; owners began to realize that mule and horse haulage never had made a good showing. They were "ripe" for some better methods—and fortunately the methods were ready.

The owner or operator looking for increased production, setting down his arguments "for" and "against," will find these points in favor of internal-combustion-locomotive haulage as compared with animal haulage. The cost of a reliable locomotive has not increased as rapidly in proportion to the work it does, as has that of mules and horses; it will haul far greater loads per trip; it will keep at its task, hour after hour, all day, without requiring any rest between trips; if properly designed, it will operate successfully underground as well as on top, without giving off objectionable fumes; it will burn only a small amount of fuel in proportion to the work it does, and will require but little lubricant; it will not require a licensed engineer, but can be operated by any man who has a fair knowledge of machinery; being built properly in the first place, it will not require any heavy outlay for upkeep; and practically without deterioration when not in use, it will not add appreciably to the overhead operating expenses of the mine when not working.

To verify the belief that one of the solutions of the acute labor shortage in our coal mines is through the introduction of efficient haulage methods, an inquiry has been conducted among some representative concerns who have given this type of haulage a thorough trial.

Their reports would indicate that the day of animal haulage is now well past and that owners who look to gasoline power may also confidently expect and realize lower operating costs.

At Philippi, West Virginia, the Morrell Coal Co. has used internal-combustion haulage from the time it started in business. The power unit is a three-ton friction-drive locomotive, and its performance has been carefully checked by the superintendent, C. M. Wolfe.

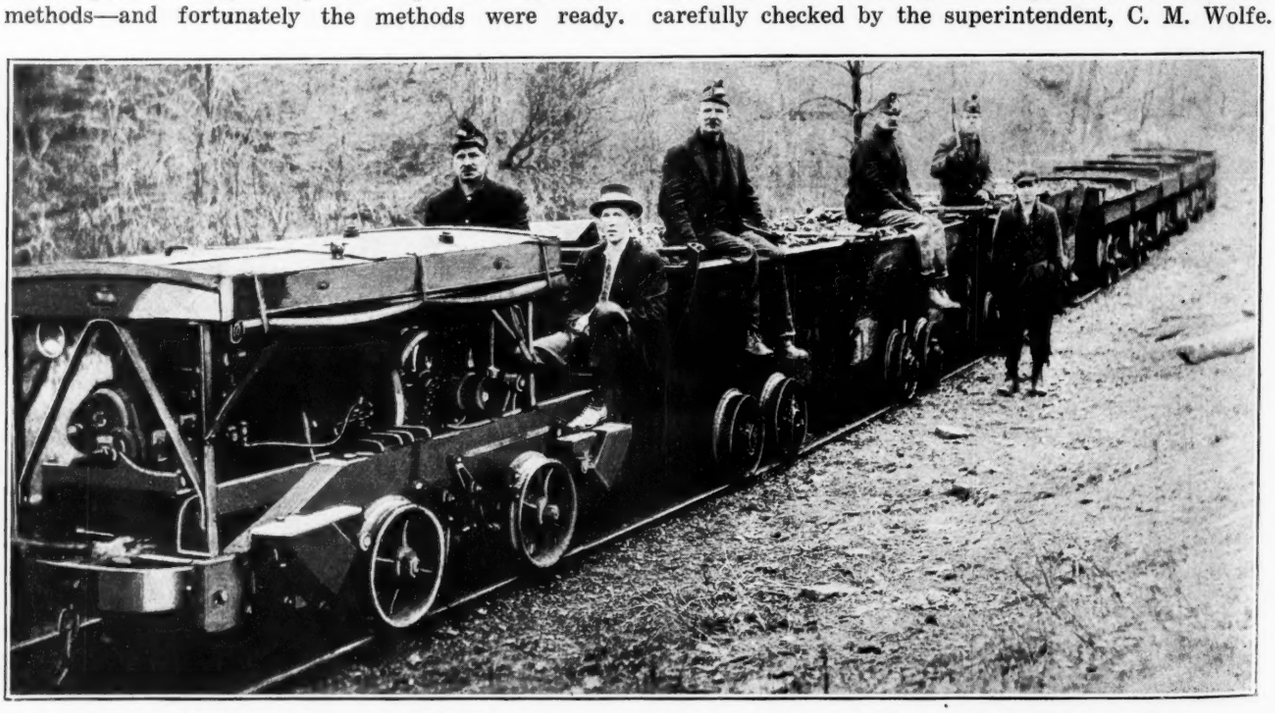


FIG. 1. GASOLINE LOCOMOTIVE WITH TRIP OF CARS AT SOUTHERN CONNELLSVILLE COKE CO., UNIONTOWN, PENN.

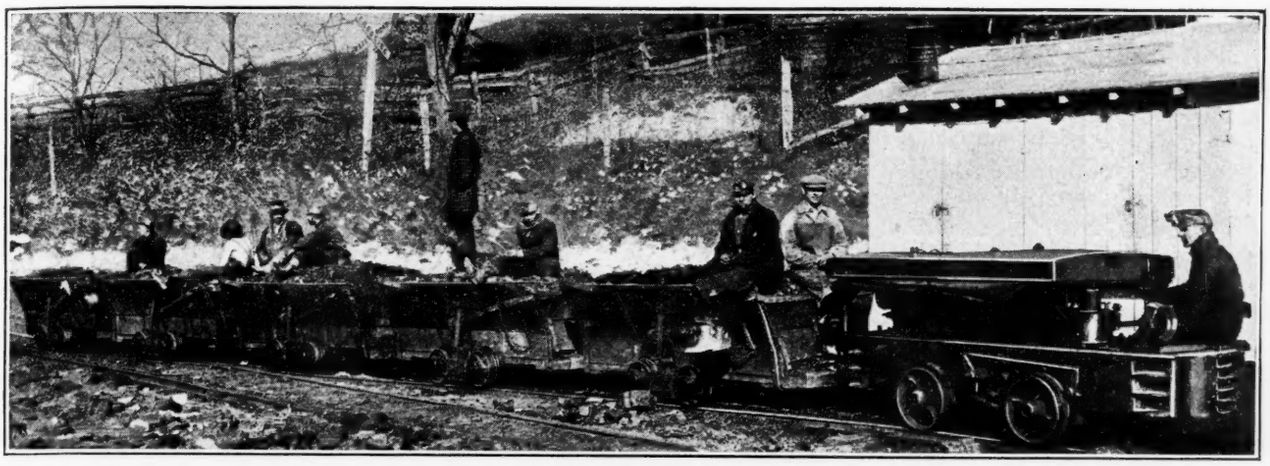


FIG. 2. LOCOMOTIVE WITH A SHORT TRIP OF LOADS, MORRELL COAL CO., PHILIPPI, W. VA.

Production averages about 400 tons per 8-hour day, and the locomotive handles the entire output with ease. It takes six-car trips, each car holding 1½ tons, and covers the round trip between mine and tipple in ten minutes.

So far—and the owners feel that a year and a half is long enough for a test—the locomotive has been economical both in fuel and lubricating oil. An average of 9 gal. of gasoline and a limited quantity of lubricant are used, and the outfit is operated successfully with only two men—neither of whom is an expert mechanic.

Using this type of power, these advantages are noted: Low operating and maintenance cost; saving in operator's wages, since no skilled engineer is required; ability of locomotive to pull extra-heavy load, taking up slack between cars without stalling; and ability to pick up speed quickly under load.

Over in an adjoining county, at Clarksburg, another company adds an enthusiastic word for gasoline-locomotive haulage. The Central Fairmont Coal Co. started its search for a worthy successor to the patient mule some years ago. Finally the president, D. Howard, found a type of locomotive that looked suitable. He questioned officials of other companies, owning the same make, and then ordered one.

Conditions at this mine put the locomotive to a really severe test. The haul is 3000 ft. long, starting underground and including a troublesome grade. These conditions did not, however, prevent the outfit from giving so good an account of itself that later the company ordered another of the same make. Both are now being used—and used hard—every day.

Both locomotives are busy nearly all of every day, but neither of them has ever shown any sign of weakening under "punishment." For about two years the upkeep has averaged scarcely more than $1 per month for each locomotive. When it came to recruiting competent operators, the officials found their troubles already settled for them by the locomotive builders themselves. The modern gasoline-haulage unit is operated and controlled in practically the same manner as is a motor truck—even the owner of a pleasure car would soon "get on to it."

With a big field of experienced truck and auto men to draw from, the Central Fairmont Coal Co. has had no trouble in locating operators of ability, men who can not only drive the locomotives forward and backward under load, but who can give them intelligent care whenever it is necessary.

Bearing in mind that each of this company's locomotives is in use nearly all day, and that they both pull heavy loads against stiff grades, the officials feel that their gasoline bills are exceedingly reasonable. Seven gallons per locomotive per day covers this item—a mere trifle compared with the cost of feed for enough mules to move the same tonnage.

The coke people, too, are "taking stock" of their haulage facilities and are finding animal power costly and unprofitable. The manager of the Southern Connellsville Coke Co. found in ten months' experience that his gasoline locomotive could make its 4000-ft. haul four times an hour. That means a round trip of more than a mile and a half every 15 minutes—32 trips each eight-hour day.

Loads at this mine average 400 bushels of coal. Figuring that the locomotive hauls more than 12,000 bushels per day for nearly 25 miles, and then covers an equal distance with strings of "empties" on the return trip, the consumption of gasoline and oil seems low indeed—5 gal. of gasoline and 1 qt. of lubricating oil. As may be judged from the illustration (Fig. 1), this outfit has few grades to contend with. Although the trip begins in the mine, no trouble is encountered with exhaust fumes—the owners finding that the locomotive operates about as satisfactorily there as on the surface.

The H. C. Frick Coke Co. is another large concern whose experiments with internal-combustion haulage have shown good results. At one of its plants—at Bute, in Fayette County, Pennsylvania—one gasoline locomotive of the friction-disk type has replaced eight mules and their drivers.

Following and profiting by the experiences of these operators, some of the strip-mining companies are already "dipping into" gasoline haulage with equally good results—though in their case the conditions are so different as to make the change even more striking.

For a "daylight" mine to adopt gasoline haulage, buying fuel at market prices, is a notable admission of the efficiency of the gasoline locomotive. A number of the large stripping companies are, of course, using steam locomotives that burn coal produced on the

spot; and it is hardly to be expected that any company would deliberately turn to gasoline machines unless convinced that the latter offered greater economies in operation.

The reasonable conclusion appears to be that, as capable men are taken by the draft, their place in the mines must be filled by better mechanical facilities in the form of digging, loading and conveying equipment.

If loyalty to the nation that has given them their chance does not alone impel those who remain to stay on the job and work all the harder, perhaps the mere "motive of gain"—an extra ply or two in the pay envelope—may help to turn the trick. But if neither of these alone suffices, no doubt a resourceful administration will find some other way.

One can scarcely believe that the great minds of a nation that has done the apparently impossible in many other directions will allow anything to seriously interfere with the production of a great war essential.

The Nerves of the Mine

BY L. B. GAWTHROP
Philadelphia, Penn.

Of all uses to which the invisible force of electricity has been put by man, perhaps the most useful, the most important and the most far-reaching in its results is the transmission of intelligence. Efficient as electric power distribution may be, other means may be found to take its place should necessity require. There are no substitutes for the telephone, the telegraph, the wireless and the electric signaling system.

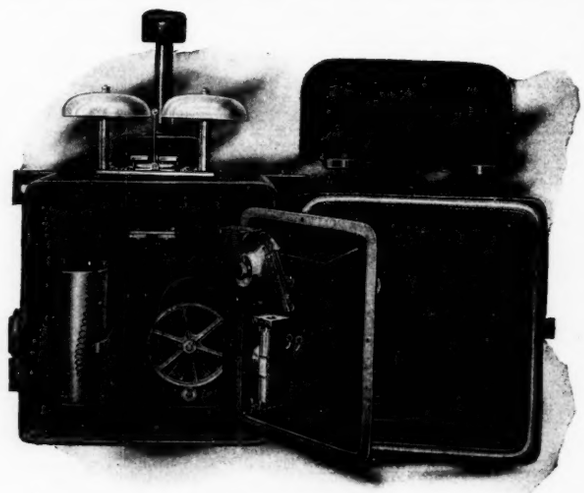
In practically all modern industrial plants the telephone and the electric signal play an important and a highly utilitarian rôle. In some instances the executive in his office may not only secure telephone connections with the heads of his various departments, but by means of instruments, such as electrical revolution counters and the like, may have actual communication with various important machines themselves and is thus enabled to know definitely at any time exactly what each unit is doing.

The coal mine is in many respects as intricate an establishment as many factories or other industrial institutions; and in the mine, also, the electrical transmission of intelligence is highly important to the smooth running of the organization, to the production of a vital national necessity, and in not a few instances to the protection of property or the preservation of life itself.

It is needless to say that signaling devices and telephones are worse than useless unless they are reliable. In any system of intelligence-transmission as intricate and complicated as that employed in a big mine, each unit and each element must be absolutely dependable. In this class of apparatus the Electric Service Supplies Co., of Philadelphia, Penn., has specialized for years and now has a line of equipment that it is satisfied is highly efficient and reliable for the purpose intended. Its mine telephones, electric signal switches and mine signal push buttons are built "on honor," of the best materials obtainable for the purpose and after designs the utility of which has been proved thoroughly in extensive practical use.

A good intelligence-transmission system in a coal mine might rightly be called the nerves of the organization. Such a system is vitally essential to maximum production, since it is through it that orders and directions are conveyed to the most remote as well as the more adjacent parts of the operation. This is accomplished quicker and more certainly and accurately by electricity than by any other means.

Giving orders quickly and intelligently naturally involves the use of the telephone, but other signaling may be done with bells and buzzers or incandescent lamps provided with their proper respective control equipments. The telephone is particularly useful to the superintendent or other official who desires to keep in close touch with all parts of the operation. This service it performs admirably, since when, we will say, the superintendent wishes to give the mine foreman certain instructions, he merely rings up, gets his man, has a few minutes talk with him and hangs up. A great saving of time has been accomplished. In addition, the executive originating the order has the assurance



EFFICIENT ELECTRIC MINE TELEPHONE

that his message has been given to the proper person exactly as he wished it given, since he spoke to the man himself just as surely as if he had conversed with him face to face.

The same applies with equal emphasis to the mine foreman or electrician who may wish to get in touch with the superintendent or any other person about the mine. The advantages enjoyed by the officials through the use of the telephone are as great in proportion as those accruing to the superintendent or other executive responsible for the operation of the entire plant.

Great as are the advantages of the electric transmission of intelligence, exemplified most forcibly by the telephone, it is in times of emergency that its full value is most significant. A failure of the mine fan, a suspension of power, in fact any emergency affecting the safety of either life or property, demonstrates the true value of the ability to rapidly and accurately transmit orders and instructions. These are the occasions when a mine telephone is invaluable; in ordinary day to day operation it does much to insure the production of maximum output, which in these days is a vital necessity.

Specializing in the Mine

By J. APPLETON and J. SOMERS
Ironton, Ohio

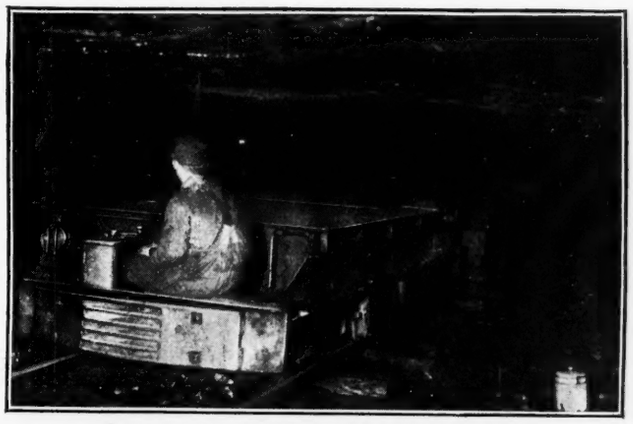
SYNOPSIS—*There was a time when a miner was a skilled workman and performed all the operations necessary in coal production. Times have changed, and the miner today is almost exclusively a wielder of the shovel. Specialization and concentration of operation have done much to boost output when output is badly needed.*

THE serious problem which at this time confronts the entire coal industry is that of mining sufficient fuel for future requirements. This must be accomplished in the face of an unprecedented labor situation and the impossibility of getting enough needed new equipment promptly, owing to manufacturing conditions brought about by the demands of the war.

Every new application and development which will accomplish something toward this end should be carefully considered, and this article is prepared with the hope that it may be of some service to coal operators in solving the problem now before them.

Best results are obtained from labor and equipment when the work is so divided that both men and machinery are operating without interruption due to any one or more parts that perform the cycle of operations being delayed. In the ordinary method of coal mining sufficient attention is not paid to this point, with the result that both labor and machinery stand idle when they might be operating to advantage.

In manufacturing operations, maximum output and reduced costs are obtained by specializing the work each man does. Both he and his equipment keep on working continually at the particular job laid out for them and are not kept waiting by the other operations which are necessary to complete the finished product.

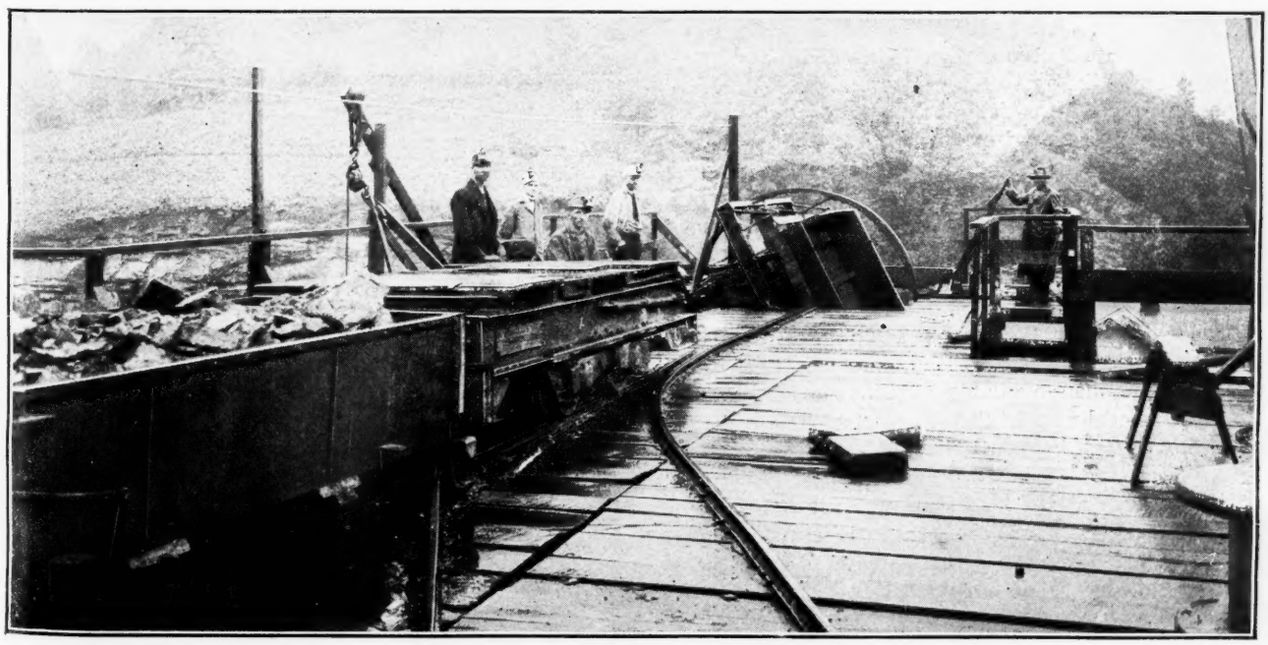


LOCOMOTIVE IN A ROOM

Let us see how this plan works out when applied to coal mines. There was a day when the miner cut his coal with a hand pick and also had all the rest of the various operations to do pertaining to coal production.

The cutting machine eliminated the pickman, and the coal miner became a coal loader. This was a decided step forward and increased the amount of coal per capita. But it did not go far enough, because the coal miner still had other duties to perform in addition to loading coal, such as timbering, shooting and sometimes laying the track.

Under the present system each miner is assigned to a particular place in the mine, and if he does not work the place remains idle. He is paid by the car for the amount of coal he loads, the other work he does being included in this price. If a man changes places he may have to do a lot of preliminary work which really be-



LOCOMOTIVE AND CARS ON ROTARY-DUMP TIPPLE

longed to his predecessor before he can start loading the coal which is the basis of his day's pay; and this he naturally objects to, as it reduces his remuneration for that day.

To make this clearer, let us consider the longwall method of mining, in which the men are not assigned regularly to any particular place but are assigned each day to any portion of the face where there is coal ready to load. For obvious reasons the longwall method of mining cannot be generally adopted, but its good features if applied to the room-and-pillar method would produce far better results than are now secured.

To explain in detail what is meant, let us consider the method used at the Bailey Coal Co. mines at Toler, Ky., where Lawrence Farrell has worked out a system which is believed to be unique.

Instead of having the loaders take up a large part of their time each morning preparing their places and the coal for loading, which means that cars and storage-

A TRIP IN THE TIPPLE

battery locomotives remain idle until this work is done and the coal can be loaded, this preliminary work is done by a few extra men who specialize on this class of operations and therefore become expert in their performance. Details of the system Mr. Farrell has so successfully worked out are as follows:

All the work of bringing down the coal is done at night. The coal is first cut; then the track is laid. A man with an electric drill follows the tracklayer, boring the necessary holes, and a shotfirer follows. Under this arrangement all the tools the coal loaders need are a pick and a shovel, which they can easily carry around from place to place. In the morning, at starting time, each loader is assigned to some working place where the coal is loose and ready to load, care being taken to concentrate the men available so that gathering and hauling of the coal may be done with efficiency and at a minimum expense.

In this way the cars and locomotives are put into operation as soon as the men start work instead of remaining idle several hours until the coal is made ready to load. This also applies to the tipple men and others who have nothing to do until coal is actually being hauled.

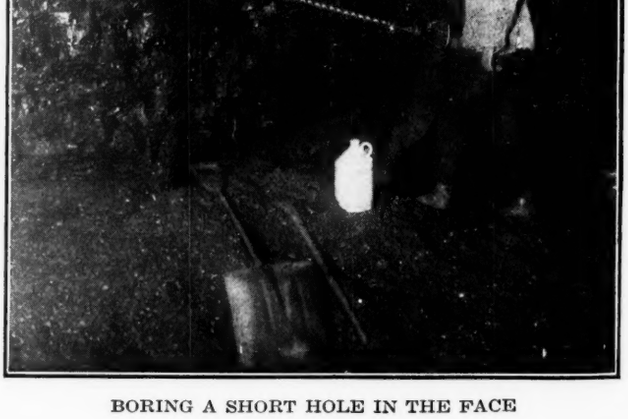
How many mines are there where it is 9 o'clock or later before the hauling of coal can be commenced, the cars and locomotives during this time remaining idle and nonproductive? To accomplish the results outlined above at the Bailey mine, only two extra men are required; and as they do nothing else, they become expert at this work. Proficiency, especially in drilling and shooting, means much.

LOCOMOTIVE AND TRIP IN A HEADING

Eliminating this special work means that the class of labor now procurable can be used to advantage. Loading coal only is done by these green men, who could not be used for drilling and shooting. Consequently, the maximum efficiency is secured from the labor available.

The cost of the extra men doing the drilling and shooting, also the powder used, is not charged against the loaders. It has been found that the increased amount of coal obtained more than offsets this expense. Also, by relieving the loaders of this work, the men are much more satisfied. They stay at the mine instead of quitting for a slight pretext, as they did under the old method.

At the Toler mine 25 mine cars designed by Captain Bailey are employed, the special feature being the large capacity of the car with minimum height. This has been accomplished by making the car overhang the wheels. A capacity of 2½ tons per car is obtained with a car 10 ft. long and 32 in. in height, this being the same



BORING A SHORT HOLE IN THE FACE

dimensions as the Ironton storage-battery locomotives employed. These cars are shown in the accompanying illustrations.

With only 25 cars and two storage-battery locomotives, 450 tons of coal per day are handled over a haul which is unfavorable, the length being 2800 ft. and the entire distance having a grade against the load, in some places reaching 5 per cent. The amount of coal loaded per man is high, averaging about 20 tons per man. The mine cars are dumped eight times per day.

With labor specialized and concentrated in this way, and supplemented by up-to-date methods of gathering and hauling by means of storage battery locomotives much can be accomplished towards meeting the present serious situation; and we hope this article may be the means of some coal operators investigating what has been accomplished with this method and the equipment employed in this mine. The method is just as practical and possible in other operations.

Minecdotes

A Slight Mixing of Words

The mechanical engineer had been having his troubles. The mines were working full time and full handed, and consequently turning out a record tonnage. Repairs were accordingly heavy, and when something broke a duplicate part had either to be made in the shop or purchased and delivered in record time.

The company operated several distinct plants, some of which were miles from the office. When a gear failed on, we will say, a picking table, it meant that the engineer must either ride horseback several weary miles, take a passenger train if convenient, run his chances of getting a ride on a "shifter," or walk. The important thing was to get to the disabled machine, collect the necessary data and get a night-letter off via the order clerk as quickly as possible regardless of personal convenience or inconvenience.

One day, after being called to one of the remotest operations to measure up and order a pinion, the mechanical engineer took up with the superintendent the question of the latter's making his own measurements for gears when occasion demanded. He assured the superintendent that it was needless to bother whether a gear was of the involute, cycloidal or radial flank contour. It was necessary, however, to state the material of which the gear was made (cast iron, steel casting, steel forging, rawhide, brass, bronze, fiber or cloth), the method of manufacture (cut or cast), outside diameter, number of teeth, width of face, diameter of bore, size of keyway or keyways if any, set screwing if any, length of hub, and the position of hub with respect to the center line of the gear face—that is, most hubs were set central and extended as far on one side of the wheel as on the other, while some hubs extended farther on one side than the other, or extended on one side only. The engineer explained also that pinions were sometimes shrouded, and in such a case it would be necessary to state the width of the working face (most easily secure by measuring the face of the gear with which the pinion meshed), the total width of the pinion tooth, the total width of the pinion over the shroud or shrouds, and state whether the shrouds were "full" or "half," one end or both.

The superintendent was much interested, as the mechanical engineer was speaking a language that he only imperfectly understood. He knew well what the face of a room meant, but the face of a gear was another matter. Involute, cycloidal and radial flank did not particularly interest him—they were out-and-out "highbrow," and non-essentials anyway. But he had to know all about shrouding. The engineer accordingly spent some time—several minutes in fact—in explaining the theory and practice of this method of strengthening gear teeth. He impressed upon the superintendent's mind that shrouding was practically always either "half" or "full," and on either or both ends. He finally made everything clear, and after counting the ties for four or five weary miles got a cold supper and a "call down" from Mrs. Engineer for being "so awfully late."

A week or so later, as the engineer was preparing to leave the office one evening, the telephone rang. The superintendent was on the wire. The pinion on the belt conveyor had broken. He had another, but thought it would be wise to keep one spare on hand. He had measured the piece and would give him the figures. The engineer got his notebook; he had obtained the measurements for that pinion a year or two before and carefully preserved them in a card index, as he had all other data of similar nature, but he wanted the superintendent to gain confidence in himself. So when he had his notebook and pencil ready he told the superintendent to "shoot."

Slowly and carefully the superintendent gave his figures, the engineer replying "Yes," "Uh-uh," "Are you sure of that?" "All right," etc. The pinion was of cast iron, it was so many inches in outside diameter, had 15 teeth, the working face was 4 in., the bore was $2\frac{13}{16}$ in., the keyway was $\frac{3}{8} \times \frac{3}{4}$ in., the total length was $5\frac{1}{2}$ inches.

"Is that all?" queried the engineer.

"Why ye—No. It's got ah—er—ah—Well, I know what it is, but I've forgot what you called it. As I remember what you told me this pinion has a complete suit of grave clothes on each side!"

In due time the superintendent got his pinion—*full shrouded* both ends.

Maximum Efficiency from Mine Cars

To a large extent maximum efficiency in coal-mine operation depends upon the facility with which the mine cars can be operated, says "Graphite Mine Car Lubricants," an exceedingly informative sixteen-page booklet compiled by the United States Graphite Co., of Saginaw, Mich., for gratuitous distribution. Therefore, to prevent delay and expense from undue wear and tear and to insure quick and easy handling it is necessary that mine cars be well lubricated. . . . Graphite grease is peculiarly adapted to this class of service, and if of the right sort will furnish lubrication of a superior degree and at the same time remove many of the objectionable features encountered in the use of oils and other greases, among them that of excessive labor cost.

Steel Mine Ties

By G. A. RICHARDSON
Philadelphia, Penn.

SYNOPSIS—*At a time when maximum production is highly desirable, steel ties possess many advantages over wooden ones. Although slightly higher in first cost, the steel tie is more efficient, especially in low coal beds; lasts longer; can be laid quicker and much more easily. The miners themselves prefer the steel ties because their use enables them to earn more.*

HOW can we save labor? How can we increase production? These two questions, important at all times, have become doubly so at the present; and we all know that coal-operating officials are finding themselves at their wits' ends to keep pace with increased demands on the one hand and a big reduction in their working forces on the other. Hence, when it is stated that the use of steel mine ties will increase production, save labor and reduce operating costs (a statement which has been made many times before), it should come home with particular force. Even if operating costs were not reduced or were made slightly greater, the first two parts of the statement justify a thorough investigation, while the complete statement expresses the cardinal aims of all business men.

The steel mine tie is no longer an experiment. It has been used successfully and for a long enough time to establish its superiority over the wooden tie, which it is rapidly replacing. As far back as 1910, one maker of steel ties put out 50,000. Sales of the Slick steel mine tie, an improved type which made its appearance on the market at the beginning of 1915, were 400 per cent. greater in 1916 than in 1915; and though further big increases have been seriously hindered by the difficulties experienced in obtaining the necessary steel, the mere statement that nearly 300,000 of this one type were sold in one section alone in 1917 gives a good idea of the demand which exists.

At the present time there are several well-known types of steel mine ties on the market. Of these, it is my intention to speak more specifically of the type known as the Slick steel mine tie, because I am firmly convinced that it possesses special features of design which make it by far the best for all-around use. Patented Jan. 19, 1915, this tie embodies improvements made as a result of a thorough study of then-existing types and their advantages and disadvantages.

In taking up the question of the actual advantages gained by the use of steel ties, the fundamental points on which these are based are as follows: (1) Size and weight; steel ties are smaller in size and lighter in weight than wooden ties for the same class of service. (2) Life; steel ties will give much longer service. (3) They are easily and quickly installed or taken out, due to special features of design.

Other points than these might be mentioned, but they would be more properly classified as subdivisions of the above, and in fact the three fundamental ones are so closely dependent on each other that it is difficult to separate them entirely. They will be brought out as the subject is developed.

Let us consider first of all the advantages of steel ties as compared with wooden ties from the standpoint of size and weight. A medium-weight Slick mine tie for 36-in. gage, complete with fastenings, will weigh about 10 lb., whereas a 3 x 4-in. wooden tie will weigh from 14 to 16 lb., depending on the kind of wood. A light-weight Slick tie for this same gage weighs only 5 lb. These savings in themselves, though important, would not warrant any unusual consideration were it not for the size and shape of the ties.

Steel mine ties are compact and have a shallow section; this latter fact makes it possible to materially modify track-laying practice. Owing to the thickness, which is only ½ in. for the light and medium-weight ties, it is possible to space them much farther apart than could be done with wood ties, because the rail between ties is supported by the floor. The actual distances of spacing will of course vary with the mine and the conditions encountered. In a large mine in Westmoreland County, Penn., one of a group that has used over 50,000 steel ties in the last two years, it is stated that wooden ties are spaced as close as 18 in., while the usual practice with steel ties is to place one at each joint and enough in between to make one tie to about

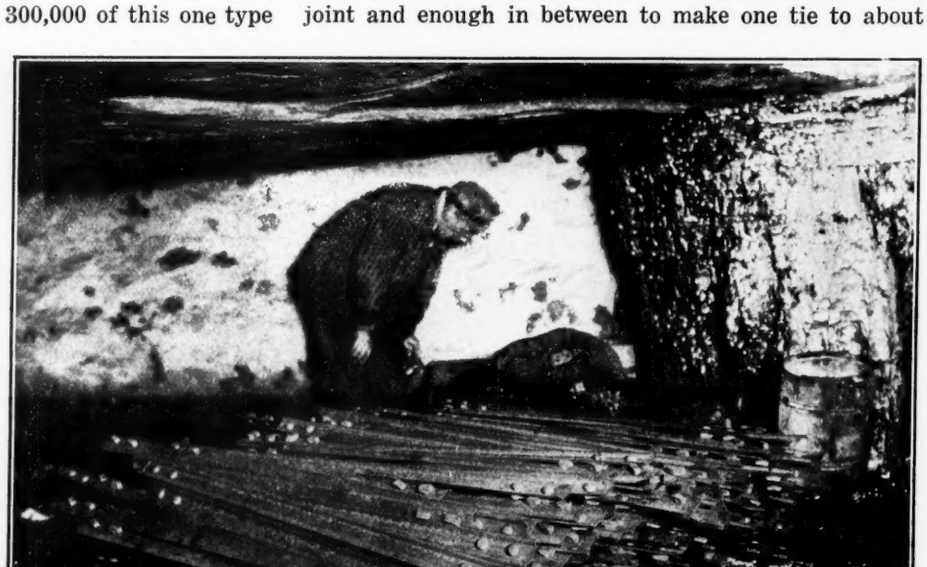


FIG. 1. PILE OF STEEL TIES, SHOWING SMALL SPACE OCCUPIED

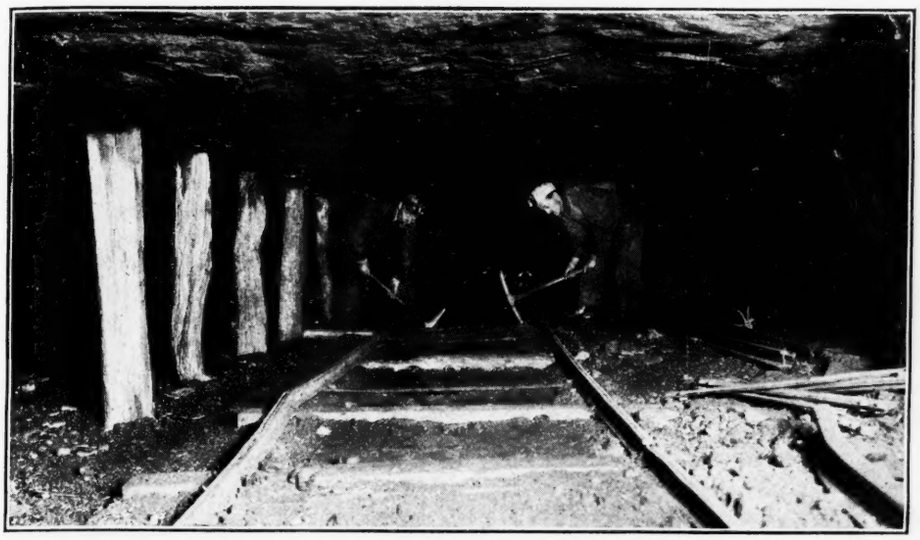


FIG. 2. TRACK WITH BOTH STEEL AND WOOD TIES

every 10 ft. If wooden ties are not spaced fairly close together the rails are apt to break because of lack of support. This particular group of mines uses medium (No. 2 Slick) ties for the most part, with 20-lb. rail at 40-in. gage for all but heavy hauling.

At another large group of mines in Indiana County where the light-weight ties are used with 16-lb. rails for all but heavy service, the usual spacing is three steel ties per 15-ft. length of rail as compared with at least five wooden ties.

It can be seen from these two examples that it is possible to reduce the weight of a track section materially; in fact, to such an extent that two men can readily lift and carry a 15-ft. section of track with 16-lb. rails. This ability to move the track readily is of the greatest importance in mining.

Another advantage which results from the extreme lightness and compactness of the steel mine ties is the fact that a miner can readily pick up as many as half a dozen and carry them under his arm to the place where he wants to use them. This means that he does not have to waste time waiting for an assistant to come and help him. He can go ahead when he gets ready, and in practice does so. Some idea of the small amount of space taken up by these steel ties can be gained from Fig. 1, which shows a pile of 360 such ties stored at the side of a main entry in a 3½-ft. coal bed. A comparison of the size of the pile with that of the spike keg in the rear, or the stooping man, clearly illustrates what it has been my endeavor to bring out. This picture was taken the latter part of June of this year.

Probably one of the best known arguments which have been made in favor of steel mine ties is that regarding the increased headroom which can be gained by their use. Owing to the fact that their depth is so slight, a gain of fully 2½ in. can be made. What this additional headroom means where the beds are thin is only too evident to the practical mining man. Primarily, it allows of the use of larger mine cars and heavier loading, and eliminates the necessity of cutting channels for wooden ties. It should not be overlooked, however, that even a few extra inches will frequently facilitate loading, especially in cramped places, and thereby increase production. In many mines with medium or low coal beds, where wooden ties have been laid on the room floor, it has been impossible to introduce a mining machine into the room on account of the height of the machine. With steel ties and the greater clearance thus afforded, the same mining machines can be used. This alone is sufficient to recommend the use of the steel tie in such locations.

Where wooden ties are used in thin beds, it is almost invariably necessary to cut channels for them in the floor in order to gain the needed clearance. It is here that a marked gain or loss in production can be made. A miner working in a 3½-ft. bed made the statement that where it was necessary for him to use wooden ties and cut the channels for them it took nearly two hours to put in 30 ft. of track. With steel ties the job could be done in five minutes. Now, in this particular seam the average loading rate is four to five cars of 1½ tons capacity each in two hours; hence the miner and his helper can make a material increase in the amount of coal sent out. When this is multiplied many times, according to the number of miners working, it becomes an important consideration.

Fig. 2 was taken in a 3½-ft. coal bed in Indiana County, and brings out clearly several points. In the first place, the comparative space taken up by wooden and steel ties when in place is clearly shown. A shortage in the supply of steel ties here necessitated using some wooden ones. This is not good practice, because the wooden ties are so much the thicker that unless a great deal of work is done a humpy track results. One such hump shows clearly in the picture.

Fig. 3, taken in another room in the same mine, shows an actual installation of track laid on steel ties as it appears under normal working conditions. Steel ties are so thin that they do not ordinarily show up clearly in a photograph.

The life of ties is naturally a factor of considerable importance, especially where an increased first cost is necessary. This is, however, a factor that is highly indeterminate and it is useless to give exact figures. There are so many things that enter into consideration, all of which have an important bearing, that no general rule can be given except to the effect that steel ties will unquestionably give better service under almost all conditions than wooden ones, and cost less per year.

As a rule the natural tendency is to think of life of ties in terms of the comparative lengths of time which they will stand up under normal conditions of service, and this is the right method in the case of ordinary track where it is perfectly possible for even wooden ties to last many years. The average condition met with in the mine is not a normal, but an abnormal, one. Not only are ties exposed to excessive moisture in many cases, but mine operation necessitates that a large part

of track laid must be taken up and moved quite frequently. It is here that the serviceability of the steel tie begins to come out most prominently. Wooden ties must be spiked, and frequent spiking shortens their life markedly. Notching to receive the rail has a similar effect. Even where the tie is not cut the statement is made that it can seldom be used more than twice, giving an average life in many cases of barely more than three to four months. Steel ties, on the other hand, will last indefinitely, and while they will rust to a certain extent this does not seem to interfere with their usefulness. They are being used continuously where there is excessive wetness.

Another reason why steel ties have a longer life than wooden ones is the fact that they are so compact that the miner will pick them up and move them, whereas he will allow the more bulky tie to lie in place.

A third fundamental advantage of steel ties is that they can be easily and quickly installed and removed, due to special features of design. As already mentioned, size and weight have a great deal to do in giving this advantage, but the special design outweighs even these. The miner wants something which can be easily and quickly put down with a minimum of effort. This has been secured through the elimination of spikes, also the necessity of setting the track to gage.

This has been accomplished by the use of flanged buttons in the case of the Slick tie. These buttons, which have been made amply large to stand the wear and tear of rough service, are so placed that they give the exact gage of the track automatically when the rails are placed for fastening. The buttons themselves are so made that they can be turned with comparative ease by means of an ordinary adjustable or solid wrench. They hold securely in any position by the friction of the rivet which keeps them in place. A single quarter turn is all that is necessary.

It can be readily seen that a tie which is self-contained and requires no extra fastenings is a big help down in the mine, eliminating many of the hindrances and wastes due to lost parts. When it is considered further that no adjusting to gage is necessary, that a few seconds are ample to fasten the track securely in place, and that the only accessory, the wrench, is easily carried, the advantages are apparent.

In many mines wrenches are never used at all, the buttons being knocked into place by means of a hammer or hatchet. This is not good practice and is not recommended, but nevertheless a large user of the light-weight ties made the statement that it is followed almost universally in his group of mines and there has been no complaint. This speaks well for the ruggedness of the ties.

When desired splice sections can be furnished, but the ordinary practice in the case of the lighter-weight ties is to do without splices of any kind. The grip of the buttons is so secure that the placing of one or two ties at each joint, the number depending on the size of tie employed, answers all purposes quite satisfactorily.

Steel ties are popular with miners in robbing pillars because of the ease with which they can be put in place and carried away. No spike bar is needed in taking the rails up, and the joints can be knocked loose. This means that the track can be readily moved while the roof is coming down, and this results not only in a saving of rails but of ties as well. Too often where rails spiked on wooden ties are used the entire track is lost.

In both room and entry work the last 15 ft. of track must be taken up each time the face is cut. Where wooden ties are used the miner does not like to go to the trouble of spiking the rails down, with the result that his car is apt to go off the track. He and his helper are then likely to get disgusted and go home for the day, and production is lowered just that much. The rails can be readily and quickly fastened down when steel ties are used.

A convenient method of extending track in rooms when steel ties are used is as follows: The mine track may be prolonged to the face workings by laying a pair of loose rails on their sides, projecting from the tie-supported track. Each loose rail fits along the inner side of each extreme track rail, with the head of each loose rail outward and the web approximately horizontal, so that the loose rail rests upon the side of its head and the edge of its flange. The head of the loose rail fits between the head and flange of the upright track rail, and the clamping buttons fit between

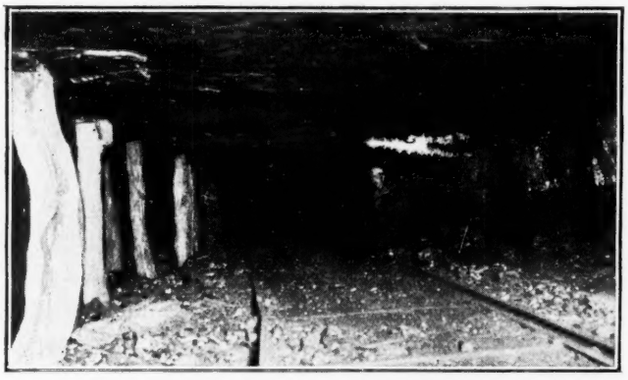


FIG. 3. TRACK LAID WITH STEEL TIES

the head and flange of the loose rail, thereby holding it in place. This latter position, while it allows the loose rail to be slid forward and backward, prevents it from accidentally getting out of position. The loose rails are easily applied to the assembled track and may be extended, as desired, to the working face by sliding the rails lengthwise until their ends reach the face workings. No fastenings or special fixtures are necessary, as the extension rails are held in place by the button fastenings in conjunction with the upright rail. The mine-car wheels run on these extension rails on their flanges, which are supported by the rail webs.

There is no question that taken all in all miners favor the steel tie in preference to wooden ones, and it is an actual fact that labor discontent and troubles have arisen over this very question. Where both kinds of ties are used it is customary to give out the steel ties for use in the low coal, with the result that the other men feel that they are being discriminated against. Perhaps the best evidence of the liking which the miners have for the steel ties is the statement that where the supply of these ties is limited a pile left lying loose will rapidly disappear, each man taking and hiding as many as he can for his own use.

The question of cost is always an important one.

The miners that I have spoken with seemed to feel that the reason steel ties were not furnished was that they cost more than wooden ones. This may be true in some cases, although the operating officials stated emphatically that this was not the reason, saying that it was simply due to the fact that they could not secure such ties as fast as they would like under existing conditions. It is true that steel ties do cost more than the wooden ones, but first cost is a small part of the expense in any mine. If increased life, increased production, a saving in equipment, etc., result, it is negligible.

Another thing that must not be overlooked is the fact that while the miner is not paid for the time he employs in laying and taking up track, he is then not only decreasing his actual production but by virtue of this fact is increasing the overhead that must be charged against each ton of coal produced.

As stated in the beginning, the very fact that sales of steel ties continue large and are on the increase shows conclusively that they are meeting requirements. It must not be forgotten, also, that wooden ties are constantly becoming more and more difficult to secure and are rapidly approaching steel ties from the standpoint of cost. Many mines—not all small ones either—are going over to steel ties entirely, and this includes ties for switches as well as straight track.

Peat Deposits of the United States

According to the United States Geological Survey, Department of the Interior, the commercial development of the vast peat deposits in the United States would materially relieve our present shortage of fuel. Although peat has never been largely used as fuel in this country because of our abundant supply of coal, which can be more readily prepared for consumption and in normal times more cheaply brought to the consumer, it has long been used in Europe, where 15,000,000 to 20,000,000 tons are consumed annually in generating heat and power.

The attempts made in this country to manufacture peat fuel on a commercial scale have not been successful, but the failure appears to have been due not to a lack of market for the product but to the lack of sufficient capital, to the inexperience of the operators, and to preventable engineering errors. It is said that air-dried machine peat, which is but little inferior in calorific value to many grades of lignite coal, can be produced at a cost ranging from 75c. to $2.50 a ton, the exact figure depending on the size and the efficiency of the plant; and it is believed that in some parts of the country it could successfully compete with other fuels for both domestic and industrial use. It burns with little smoke and ash, and wherever it has been used in this country it has proved very satisfactory and has found ready sale as fast as it has been produced.

The wide interest felt in the larger use of peat in the United States is expressed in recent messages from the governors of Maine and Massachusetts to the legislatures of those states, recommending an investigation of the local deposits of peat and its possible use to relieve the present shortage of fuel.

The lack of other fuel in many European countries is now being supplied in part by an increased use of peat. According to United States Commerce reports 216 peat machines were in operation in Norway in 1917, compared with 55 in 1916 and 36 in 1914. Among these were two automatic machines, each costing $13,400, having a daily capacity of 30 to 40 tons of fuel, and requiring only two men for its operation.

Peat consumed in a properly designed gas producer yields gas of good quality and in abundant quantity in comparison with the yield from coal, as well as many valuable byproducts. This is perhaps the most effective utilization of peat fuel for generating heat and power, because peat that is to be used in this way does not need to be so carefully prepared nor so thoroughly dried as peat that is to be consumed under steam boilers.

Specific information with regard to the use of peat in gas-producing plants and for other purposes is given in a bulletin prepared under the supervision of the United States Geological Survey but published as Bulletin 16 of the Bureau of Mines, from which copies of it may be obtained.

Coal Age Index

The indexes to *Coal Age* are furnished free to all who ask for them. The index for the first half of 1918 will be ready for distribution next week, and a copy can be had by addressing a post card to the Subscription Department of *Coal Age*.

Ideas and Suggestions

THE coal-mining industry is confronted this year with the task of producing more coal than was mined in any other year of its existence. It must do big things in the way of production if the exacting demands of our war machine are to be satisfied. To win the conflict in which we are now engaged American plants must turn out more guns, more ammunition, more ships, more airplanes, more clothing—in fact, more of everything. In the final analysis this means more coal, for without fuel industry must cease to function. The relative value of little things to the larger undertaking of winning the war cannot be overlooked, and in no industry is this statement more true than in coal mining. Sadly depleted of man power, with equipment and machinery on the verge of breakdown because there is no letup for repairs, many coal-mining plants have been enabled to work day after day only by the ingenuity of their engineers. To assist the entire industry by the interchange of ideas that will lead to greater and more efficient coal production is the basic idea underlying the "Ideas and Suggestions" department of *Coal Age*. Therefore, if you know of a plan or of a device that proved its worth in time of need, write it up for the aid of others who may at this moment be in need of it. If you have a suggestion to make which will lead to more steady and more result-producing work on the part of the mine workers, make it directly to the industry through the columns of this journal. Diagrams, photographs and sketches that help put the idea over should accompany all manuscripts. Aside from enabling you to do your part in assisting the industry, is the fact that *Coal Age* pays liberally for all ideas and suggestions suitable for publication.

Electrical Labor-Saving Devices in Coal Mining

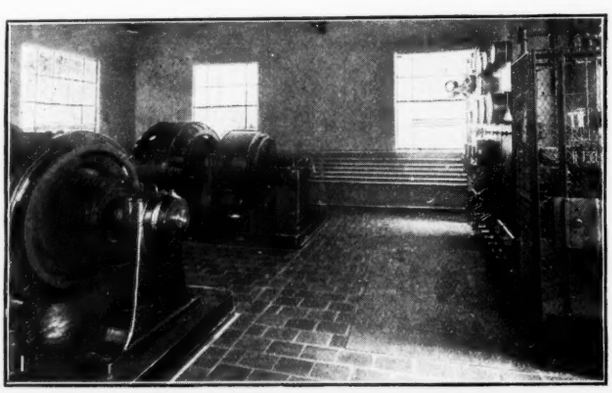
By GRAHAM BRIGHT
East Pittsburgh, Penn.

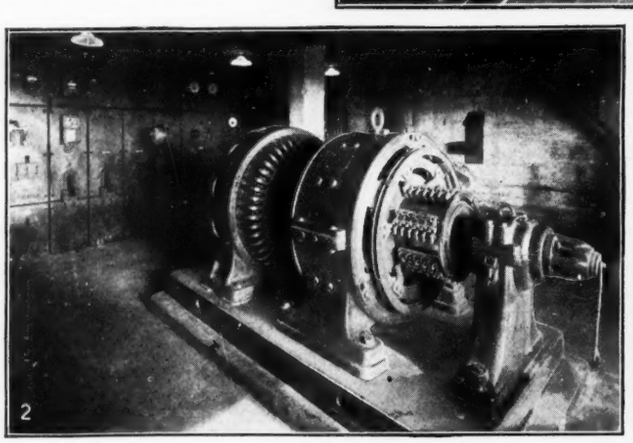
SYNOPSIS—*If coal production is to be maintained, all labor-saving devices available must be employed in mining. It is noticeable that practically all such devices now in use are electrically driven. It would appear that as men become scarcer machines must take their place. Greatest efficiency will be attained when a few experienced men operating machines supplant the large number of more or less ignorant and inexperienced miners usually employed.*

THE great increase in the demand for coal, coupled with a decrease in the supply of workmen and an increase in the cost of labor, makes it imperative that in order to keep up the production of coal labor-saving devices must be utilized to their fullest extent. It is true that many mining companies have installed considerable labor-saving equipment during the recent past, but the acute conditions brought about by the war make it necessary to leave no stone unturned to increase production. Although many labor-saving devices are more or less of a mechanical nature, a large proportion of them depend upon electric power for their operation. Since all mines use more or less power, there is a considerable field in the power department to install labor-saving devices. Where steam power alone is employed, some economies can be effected by the use of stokers, coal- and ash-handling equipment, feed-water heaters and purifiers. However, to effect real economy —not only to save labor but to cut down the cost of producing power—the steam should be replaced by the electric distribution with current either generated in an isolated plant or else purchased from a central-station company.

Where central-station power is available it often shows much greater economy both in regard to the amount of labor employed and the cost, when compared to an isolated electric plant. An isolated electric plant will effect some saving in labor, owing to the higher economy of electrical apparatus when compared with steam. The greatest economy, however, is often obtained only with the use of central-station power. I might cite one case of a mine in Alabama which is operated entirely by steam. Water is obtained from a river pumping plant, necessitating a separate boiler plant. The boiler plants alone are operated by the following labor: Main boiler plant, 6 day firemen, 1 day foreman, 4 night firemen, 1 night foreman, 6 ash rustlers; river boiler plant, 1 day fireman and 1 night fireman.

By the use of central-station power all of this labor could be dispensed with. Under present conditions the cost of labor at the boiler plants alone would be as great as the entire power bill, if central-station energy at ordinary rates were used. Central-station power has a further distinct advantage in increasing the output of a mine. The principal business of a coal-mining company is to mine and ship coal, and the operating force is generally selected with this end in view. The efficient production of electric power is a business by





FIGS. 1 TO 3. SUBSTATION EQUIPMENT INSTALLED AT COAL MINES
Fig. 1—Two 200-kw. synchronous motor generators, capable of supplying mine with capacity of 2000 to 3000 tons per day. Fig. 2—Mine substation with 200-kw. motor-generator set. Fig. 3—Synchronous converter of 500-kw. capacity

itself—entirely different from that of mining coal. As it is practically impossible to obtain men expert in both fields, a mine can be operated much more efficiently if all the time of the operating force can be devoted to the production and shipment of coal.

With purchased power most of the motors outside of the mine can be of the alternating-current type, receiving their power from static transformers, which in turn do not require any attention. Direct-current power for haulage and cutting is obtained from motor-generators or converters, which require only an occasional inspection.

Fig. 1 shows a substation equipped with two 200-kw. synchronous motor-generators capable of supplying power for a mine having a capacity of 2000 to 3000 tons per day. Fig. 2 shows a substation located inside of a mine equipped with one 200-kw. motor-generator set. Power is received from a cable installed in a borehole from the surface. Fig. 3 shows a synchronous converter of 500-kw. capacity. This equipment will require much less attention than a steam plant of the same capacity.

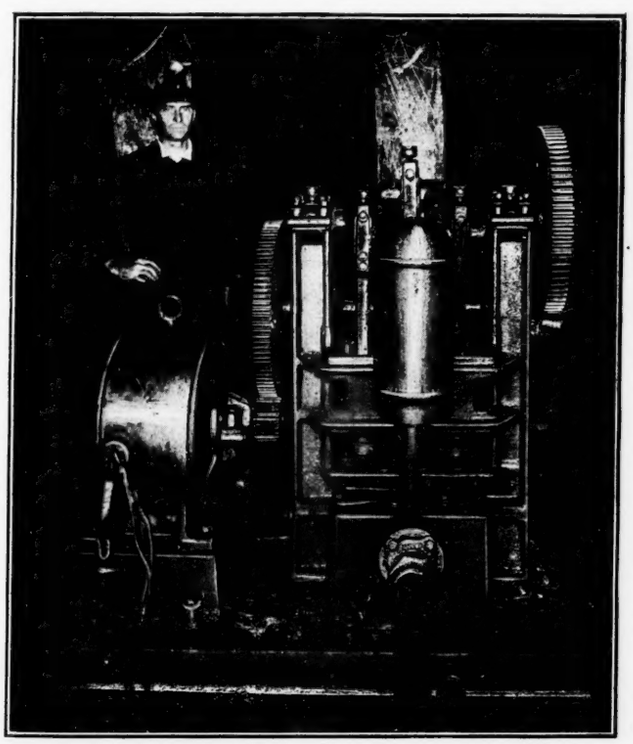


FIG. 4. GOULDS MOTOR-DRIVEN TRIPLEX PUMP

Practically all coal mines have to pump more or less water. The amount handled ranges from little or none in some of the drift mines of the bituminous field to several times the weight of the coal output at some of the anthracite operations. Where steam or compressed air is used for driving mine pumps, inefficient operation takes place.

Steam- or air-driven pumps require considerably more attention than motor-driven machines, and their poor efficiency, coupled with the pipe-line losses, means that more steam must be generated and more coal burned under the boilers, entailing not only more cost but more labor than when motor-driven pumps of similar capacity are employed.

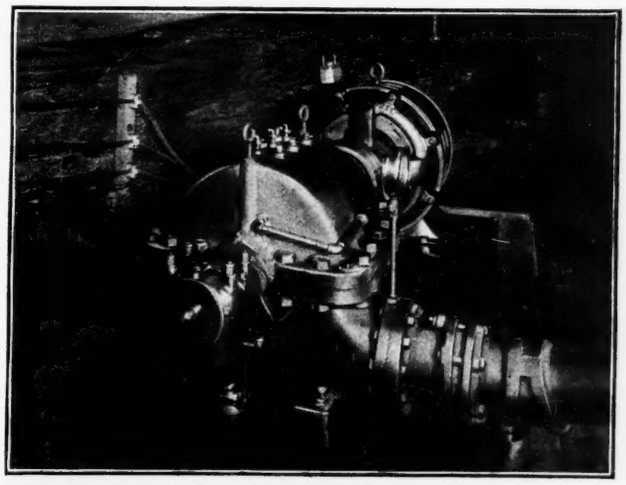


FIG. 5. GOULDS MOTOR-DRIVEN CENTRIFUGAL PUMP

Motor-driven pumps may be operated by either direct- or alternating-current motors and may be of the reciprocating or centrifugal type. Fig. 4 shows a Goulds motor-driven triplex pump, and Fig. 5 shows a Goulds motor-driven centrifugal pump, both located in mines. These motor-driven pumps do not require starters, but can be directly connected to the power system. If power should go off and come on again, the pump will start up without requiring attention. These pumps are sometimes used in connection with a float switch which automatically starts and stops the pump at the proper time.

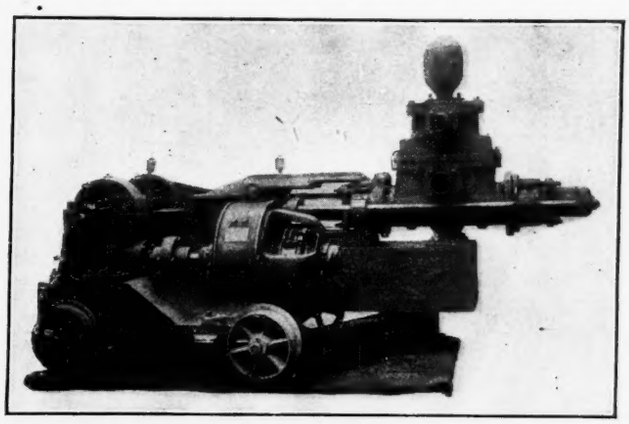


FIG. 6. PORTABLE MOTOR-DRIVEN PUMP

Fig. 6 shows a portable motor-driven pump which can be moved quickly to any part of the mine. This could not be done readily with a steam- or air-driven pump.

It is of course desirable that the ventilating system of a mine be thoroughly reliable, and there are many records showing steam fans in continuous operation

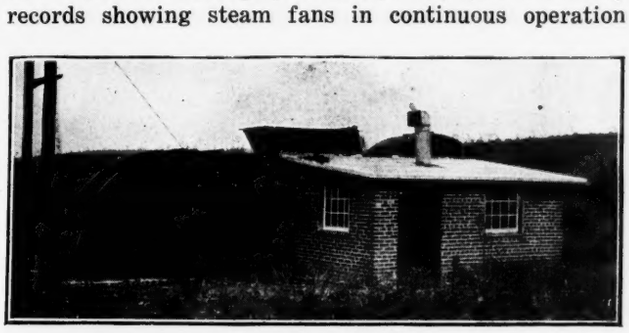
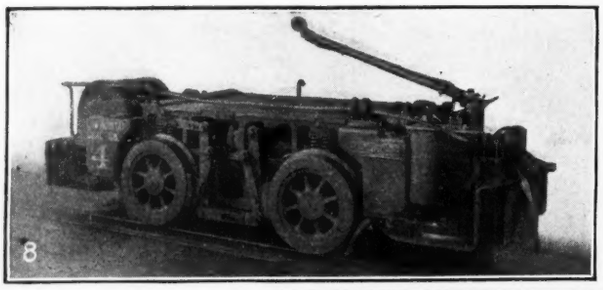
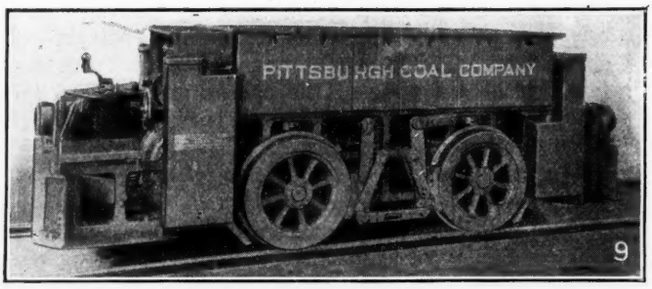


FIG. 7. FANHOUSE OF LEHIGH VALLEY COAL CO.





FIGS. 8 TO 10. THREE TYPES OF LOCOMOTIVES USED IN MINES
Fig. 8—Reel-type locomotive. Fig. 9—Storage-battery locomotive.
Fig. 10—A 35-ton three-motor locomotive

for long periods of time. Since the power required for ventilation is often a fairly large percentage of the total amount required at a mine, a fan should necessarily be economical in its use of power. An electric motor will in most cases be more reliable as well as more efficient than a steam engine. Fig. 7 shows a fanhouse of the Lehigh Valley Coal Co. The fan is driven by a 30-hp. motor and is controlled from a substation 1½ miles away.

It may be said safely that in the haulage system of a mine one of the most striking economies is obtained both in amount of labor involved and the expense of transportation by substituting electric power for animal or some forms of mechanical haulage. For gathering service, either the trolley type of locomotive with a reel or the storage-battery machine is rapidly replacing animals. One locomotive will replace two to four mules or horses, and since each animal not only requires a driver, but attendance when in the stable, a saving in labor will arise from its substitution. Fig. 8 illustrates a reel type of locomotive while Fig. 9 shows a storage-battery machine. For main haulage there is no comparison between the locomotive and animal haulage. This arises from the great distances traversed and the speed necessary. The capacity of locomotives for main haulage is becoming larger each year, until greater capacity can only be obtained by using two locomotives in tandem. Fig. 10 shows one of the 35-ton three-motor locomotives used in the Berwind-White mines at Windber, Penn. This is the largest locomotive operating inside of a mine in this country. The maximum length of haul is here close to 20,000 feet.

When vertical shafts or steep slopes occur, the coal must be brought up them by means of a hoist. The substitution of electrically driven hoists will effect a saving both in labor and cost of operation. A rather notable example of what can be accomplished by changing a hoist from steam operation is shown in a paper presented before the American Institute of Mining Engineers at its 1918 February meeting at New York, by R. E. Hobart, mechanical superintendent of the Lehigh Coal and Navigation Co., entitled "Economy of

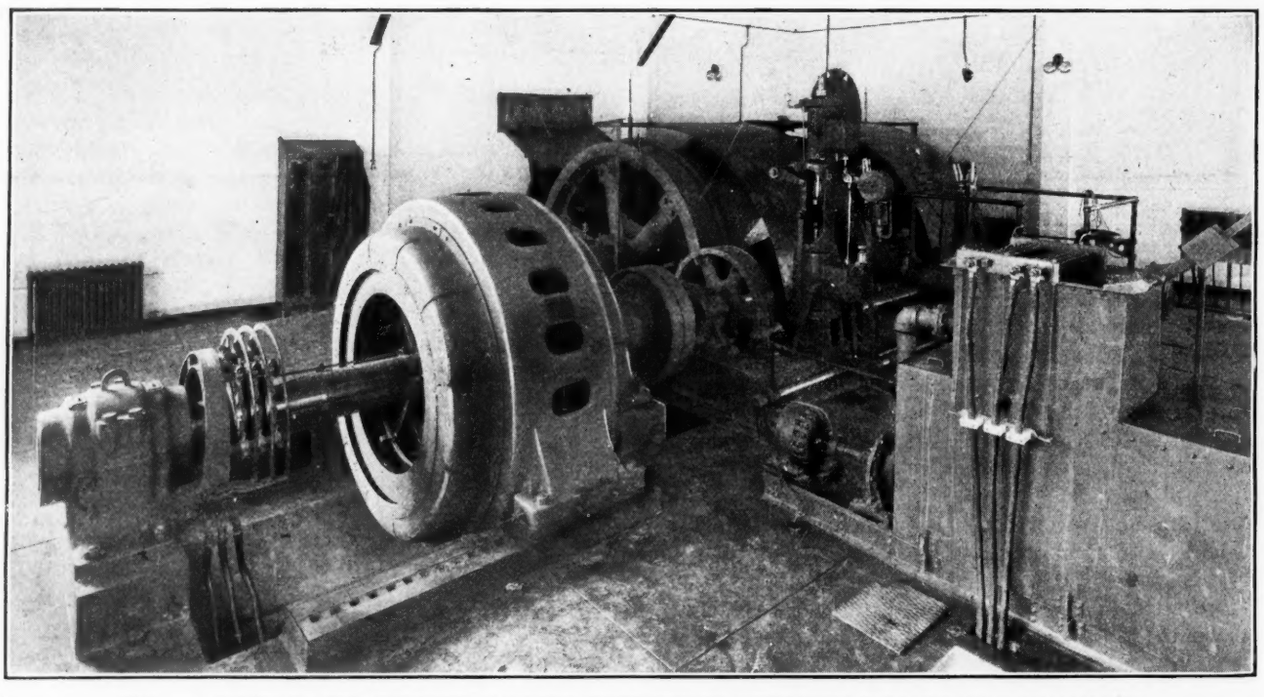


FIG. 11. HOIST OF THE INDUCTION MOTOR TYPE WHICH EFFECTED REMARKABLE ECONOMIES

Electricity Over Steam for Power Purposes in and About Mines." This paper shows that some remarkable economies were obtained, the results being based on operation of a year's duration. Fig. 11 shows the hoist in question, which is of the induction-motor type, having a continuous rating of 750 hp. with a capacity of 50 per cent. overload continuously. The mechanical parts of the hoist were furnished by the Vulcan Iron Works, of Wilkes-Barre, Penn., and the electrical equipment by the Westinghouse Electric and Manufacturing Company.

A great saving in labor inside of the mine can be effected by the use of small hoists of the winch type. These machines will take care of hoisting and lowering cars over steep grades where they cannot be economically handled by other means. The hoists are so simple that any miner, even though inexperienced, can operate them.

Where large hoists are involved and heavy peaks are objectionable, a direct-current motor, receiving its power from a flywheel motor-generator set should be employed. The largest hoist in America is of this type, and is illustrated in Fig. 12. This hoist is located in a large copper mine in the West. Two other machines for which the electrical equipment is a duplicate of the former have been installed recently. The hoist motor has a capacity of 2000 hp., continuously.

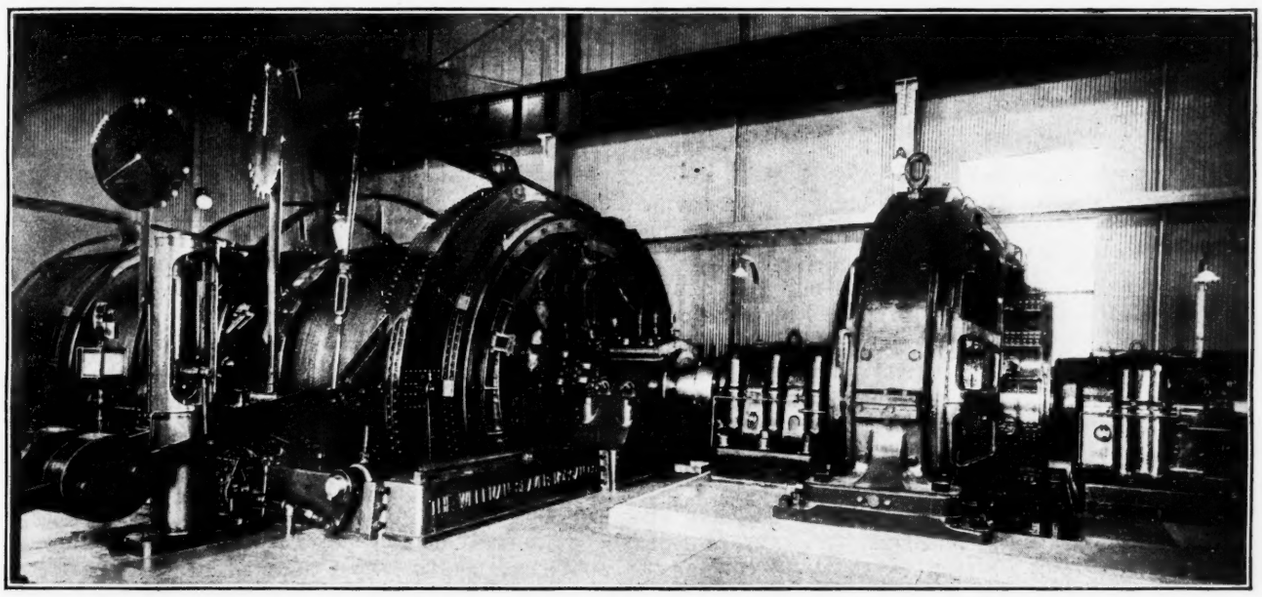


FIG. 12. DIRECT-CURRENT MOTOR DRIVES THIS HOIST, SAID TO BE THE LARGEST IN AMERICA

The greatest apparent saving in labor about a mine can be effected in connection with the actual digging of the coal itself. The use of coal cutters and loaders will greatly decrease the number of men required. Different conditions of roof, bottom, etc., often determine the type of machine best adapted to the work. The air puncher was a great improvement over the ordinary pick method of undercutting, and resulted in a considerable saving of men. The breast, longwall and shortwall chain-cutting machines, however, are the greatest labor-saving devices about a mine. One mining machine will easily do the work of from 20 to 25 miners and requires only two men to operate. Fig. 13 shows a shortwall cutting machine built by the Jeffrey Co. It is a compact piece of apparatus and will operate in low coal.

A suitable loading machine should effect a considerable saving in labor. This machine may be made fairly light and portable, and only requires that the coal be loaded on the front end.

A complete description of a machine that mines and loads coal without the aid of explosives was given in *Coal Age* of April 13, 1918. This machine should show the greatest labor saving of any device about a mine.

A new machine called a scoop hoist is being tried out in both anthracite and bituminous fields. It is especially adapted to low coal, and some bottom is taken up to enable a car to be brought up to the mouth of the room with the top of the car about level with the room floor. A V-shaped scoop is pulled into the room by means of a tail rope, and when pulled out drags a certain amount of coal with it. The scoop is pulled over a sort of gang plank and deposits the coal in the car. When pulling coal out the scoop really works something like a snow plow pulled backward. A small reversing motor is required, and the device should replace several loaders.

One of the greatest advantages to be obtained by the use of the foregoing devices is that instead of a large number of unskilled men working in the mine there will be a comparatively few experienced men who realize the dangers of mining and will exercise the care necessary to prevent accidents and explosions.

The mine telephone has proved a great labor-saving device. When trouble occurs, and a telephone is available, machinery can be set in motion at once to right the difficulty. The superintendent, mineboss and electricians can keep in touch with various parts of the mine, so that the efficiency of operation can be kept at its highest.

After the coal leaves the mines there is still a large field in which labor can be saved in its handling. Most of the large users of coal have good facilities for taking care of it when received by cars or boats. Until recently the docking facilities on our seaboards have been

inadequate, not only entailing the use of considerable labor but causing needless delays. Some large and expensive coal docks have recently been put into commission on the eastern coast of the United States, and the saving effected in labor and time has been great. This subject has been quite fully covered in an interesting article published in *Coal Age* of May 18, 1918, by C. L. Packard, of the General Electric Co., entitled "New Methods of Hauling Coal Electrically."

New ways and means are being constantly devised to facilitate the handling of coal from the face in the mine to the ultimate consumers. It is significant that

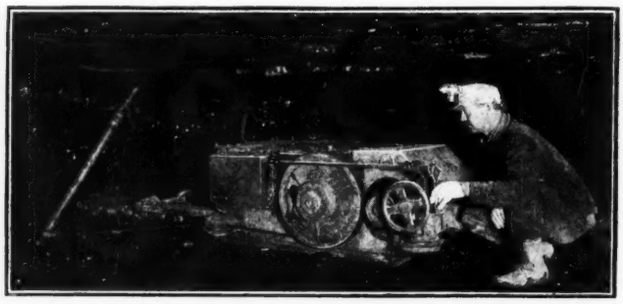


FIG. 13. JEFFREY SHORTWALL CUTTING MACHINE

in practically all cases these new methods utilize electric power in some form or other to accomplish a saving in labor, which at the same time leads to a considerable saving in expense.

It is strongly suggested that the operator keep a more accurate record of the time lost by men and the costs of operation. In no other way will the advantages and economy of electrically driven mechanical equipment be as readily apparent. The large manufacturers of electrical equipment are always ready to help the operator in making a study of his special conditions, including tests of his entire plant and securing the data necessary to enable a complete report to be made, analyzing the conditions in detail, and showing the economies and savings effected by the use of electrical equipment.

Haulage and Loading Equipment

By E. M. Mackie
Syracuse, N. Y.

It may safely be said that in most mines more coal can be cut than there are facilities for taking out, also that the labor entailed in removing the coal is much greater than that expended in the actual cutting. This means that any device or arrangement that will make easier the loading and hauling of the coal will result in a great reduction of time and labor.

When the loaded cars have been delivered to the entries, their haulage, even for miles, is a comparatively simple proposition, but the getting of empty cars placed and loaded, and loaded cars removed from rooms and back-reaches, also the delivery and loading of coal from low rooms, is a far greater problem than the straightway haulage in the entries. Because of the conditions of service any apparatus used in this work must be readily portable, simple, efficient and as nearly foolproof as possible.

The application of electrically operated haulage engines or hoists to this class of coal-mine operations has now passed the experimental stage. The Pneumelectric Machine Co., of Syracuse, N. Y., has successfully developed a line of haulage devices that is well worthy of consideration, in connection with interior haulage and loading problems.

The following brief description of various pieces of such equipment and their application may be helpful to mine men, especially in these days when labor is scarce and sorely needed in the coal fields.

The single drum haulage engine or room hoist is a handy little machine that has been called the greatest saver of man power in a mine. Weighing approximately 950 lb., with no rope on the drum, and occupying a space of only 28 x 38 in. and 26 in. in height, there are but few locations in which this amount of space is not available.

Its capacity may be stated as being 1500 lb. rope pull at a speed of 100 ft. per minute, and this may be ap-

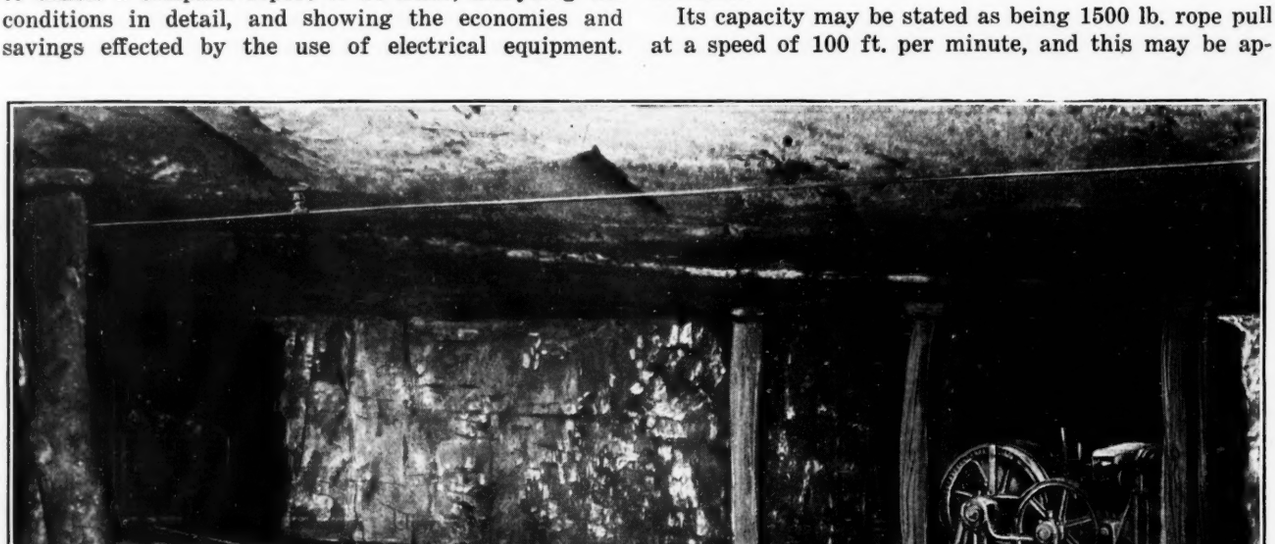


FIG. 1. THIS SINGLE-DRUM ROOM HOIST SAVES CONSIDERABLE MAN POWER

plied to any kind of haulage within the capacity of the machine. Maximum drum space will accommodate 900 ft. of ⅜-in. steel cable. A view of this hoist is shown in Fig. 1.

This hoist may be mounted on a truck as a portable unit. A diagram of the application of such a mounting is shown in Fig. 2. This machine may also be provided with two drums instead of one. It can readily be seen that with this type, cars loaded or empty, on variable grades, may be easily handled and are always under control.

Quite recently this type of hoist has taken a prominent part in the development of methods for hauling

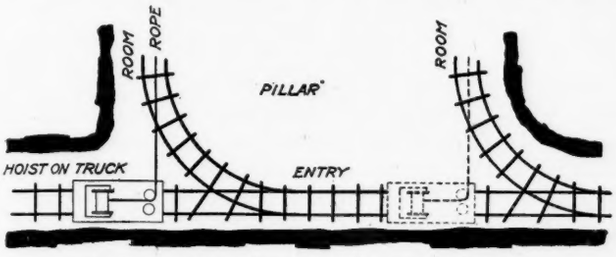


FIG. 2. DIAGRAM OF HOIST MOUNTING

and loading coal from rooms to entries or headings in the anthracite fields. In this work two systems are being used and developed. One is known as the pan delivery system, and the other as the scraper loader system.

In the pan delivery system the coal is loaded on the pan at the face, by hand, and then hauled to the entry or heading to be dumped into a car. After dumping, the pan is hauled back to the face; the forward and backward haulage is accomplished by a double-drum hoist.

In the scraper loader system the scraper is hauled along the face, gathering a scoop load of coal, which it then conveys to and dumps into a car in the entry or heading. After dumping, the scraper is hauled back to the face. With this system hand loading is eliminated.

Besides the aforementioned haulage devices, there is another effective piece of apparatus designed for mounting on a locomotive, its dimensions being such that when so mounted it does not extend beyond the overall dimensions of the locomotive framing. This device is known as a gathering attachment, and its use on a locomotive provides it with a "long arm" by means of which it is able to reach out and gather in cars from locations that without the help of the gathering attachment could not be served by this machine.

Another member of the same family is the capstan. This is a rugged and foolproof haulage device, capable of quickly saving its cost wherever there is a hard pull needed. It weighs only 450 lb. and can be put in a space of only 24 x 30 in. This device is well known to many readers. It is essentially a cathead or vertical winch equipped with suitable driving apparatus.

The old hee-haw mule for a long time took care of the interior haulage problem, and where he could not be used man power took his place. But today men are scarce and we need old hee-haw above ground behind our boys at the front, so the mines now have to depend on mechanical mules. Fortunately, these have been developed to suit the exigencies of mine service, and every day sees them being adapted to new uses.

Legal Department

AVOIDANCE OF ILLINOIS WORKMEN'S COMPENSATION ACT—In order that an employing coal operator can avoid liability to pay compensation for an injury under the Illinois Workmen's Compensation Act, he has the burden of proving, not only that the Industrial Board had been notified that he elected not to be bound by the act, but also that the injured employee had received a copy of such notice, or that the notice had been duly posted as required by the law. (Illinois Supreme Court, Barnes vs. Illinois Fuel Co., 119 Northeastern Reporter, 48.)

COMPUTING AWARDS UNDER MICHIGAN LIABILITY ACT—Deceased had been employed by defendant coal company for several years, excepting a short interval within the last year preceding his accidental death, which occurred in the course of his employment. Held, that an award against the company in favor of the surviving widow should be computed on the basis of the decedent's average daily wage earned after his reinstatement, and not on the lower wages earned by him within the year but before the strike. (Michigan Supreme Court, Brown vs. Central West Coal Co., 166 Northwestern Reporter, 850.)

ACCIDENT AND DISEASE AS CONCURRING CAUSES OF DEATH—If accidental physical injury concurs to hasten an employee's death, a previously diseased condition of his body will not relieve his employer from liability for payment of an award to the employee's dependent relatives under the Indiana Workmen's Compensation Act. Hence, where the immediate cause of a miner's death, through rupture of his aorta, was a strain in moving coal, his dependents are entitled to an award notwithstanding the fact that a diseased condition of the aorta may have been a concurring cause. (Indiana Appellate Court, Indian Creek Coal and Mining Co. vs. Calvert, 119 Northeastern Reporter, 519.)

CONTROL OVER INTRASTATE RAILWAY PRACTICES—Interpreting statutes of Nebraska, the Supreme Court of that state decided in the recent case of Rivett Lumber and Coal Co. vs. Chicago & Northwestern Railway Co., 167 Northwestern Reporter, 570, that where there is attempted discrimination between persons and associations by a railway company, and one is not allowed reasonable and equal terms, service, facilities and accommodations, the courts have jurisdiction to grant redress; but that where the question raised is whether a community or locality is properly served by the railroad company, as where the company refuses to construct side tracks or switches to serve industries, such question should be presented to the State Railway Commission for determination.

MINE OWNER'S LIABILITY CONCERNING MINE FOREMAN'S NEGLIGENCE—The business of making or directing excavations for overcasts in the roof of haulways or air courses in a West Virginia coal mine as the operations progress, for properly ventilating the mine, and of making the places of work safe, is by the laws of the state devolved upon the statutory mine foreman, and his negligence in the performance of these duties, unless he is authorized by the mine owner to represent him in other ways incompatible with his statutory duties, as in the employment and discharge of miners, can not be imputed to the owner and render him liable for personal injuries sustained through such negligence. Authority of the mine foreman to represent the mine owner beyond his statutory duties must be proved either by express authority given, or by such open, apparent and notorious acts and conduct on the part of the mine foreman that it is evident they must have been known to the owner of the mine, and approved by him. Proof of one or two isolated instances is not sufficient to establish authority by implication. (West Virginia Supreme Court of Appeals, Strother vs. United States Coal and Coke Co., 95 Southeastern Reporter, 806.)

The Emergency and Clean Coal

By G. H. ELMORE
Philadelphia, Penn.

SYNOPSIS—*An increase in the quality of output is as essential as an increase in output. The older washeries were an aggregation of mechanical equipment, heavy, cumbersome, and at best somewhat disappointing in operation. More modern machines have been devised that are smaller, lighter, are controlled automatically, and give a much more uniform product.*

THE bituminous operator who appreciates the present situation, who is called upon for maximum production, who knows full well the prices he must pay for everything in the line of mining equipment and all materials that enter into plant construction, who knows the scarcity of labor and its high wage, will doubtless shrink at the thought of entering on any elaborate plan of plant construction, the object of which is solely to improve the quality of his coal.

The history of last season's production has in it several things other than coal that are black. Leaving out the story of the failure of the railroads, cold homes, and industries without fuel, perhaps the one consideration that impressed the average user of bituminous coal the most was the poor quality of the product furnished to him. *Coal Age* has repeatedly and in a forceful way called to the attention of the bituminous operators the necessity of remedying this condition. The arguments used need not be repeated here.

Economically and morally, it is a crime to ship dirty coal. By dirty coal I mean coal that contains more impurities than can reasonably be expected to be removed from it. There are certain well-known methods of preparing dirty coal for the market. When these are employed, they produce results that are satisfactory both to the consumer and to the Government.

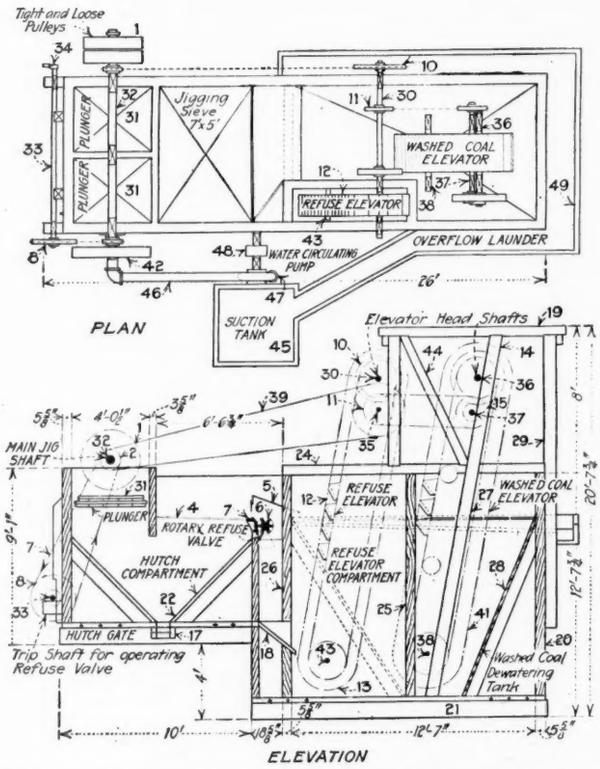
I cannot believe that the operators who, last season, shipped trainloads of waste material did so through choice, but that in a situation of bewildering stress it was more or less the force of circumstances that compelled such shipment. Since then there has been time for reflection, time to take stock of all questions entering into the problem, and it must be true that the moral sense of the bituminous coal operators of this country will prevent them from repeating the practices so prevalent last season. In the last analysis, it is the moral questions involved in these great issues that shape their course.

All laws of conduct are founded on questions of right and wrong. Economic and other considerations take second place. There can be no doubt nor argument on the question of right and wrong involved in shipping and selling as coal material that is not coal, and which could, with reasonable care and expenditure, have been eliminated. If this practice is continued during the coming season, it should be regarded by both the people and the Government as a crime.

What then, under present conditions, can the operator be properly expected to do to right this matter? There are many reasons why the operator cannot be asked to incur large expeditures for elaborate plant construction. The Government's need for the construction materials that would be required and the great scarcity of labor are in themselves sufficient causes for this, but the real reason lies in the fact that such expenditure and elaboration are not necessary. For it will be here shown that with an exceedingly simple plant, which can be erected and put in commission at moderate cost, these much-desired results can be obtained.

It will be understood that what is here outlined pertains chiefly to the production of bituminous coal for fuel purposes and has no relation to the preparation of coal for metallurgical use, such as blast-furnace coke, etc. The whole discussion is further simplified by the fact that only the slack and the nut need be considered. When these two sizes are removed, the remaining product can easily be hand-picked.

Under the present stress for maximum production, there frequently may be found sources whereby considerable tonnage can be secured other than from the



FIGS. 1 AND 2. PLAN AND CROSS-SECTION OF A COAL-WASHING JIG

regular run-of-mine, such as clearing up of old dumps made in the days when coal was cheap and when much good fuel was consigned to them, the cleaning up of old workings, or even the handling of certain portions of the bed that have heretofore always been discarded. Any or all of these may become sources of

considerable revenue and production. In many cases they can be treated in the same plant with run-of-mine, slack or nut, combined making a good market product.

The modern coal-washing plant is a decidedly different affair from its predecessor. As in everything else pertaining to coal mining, the last few years have

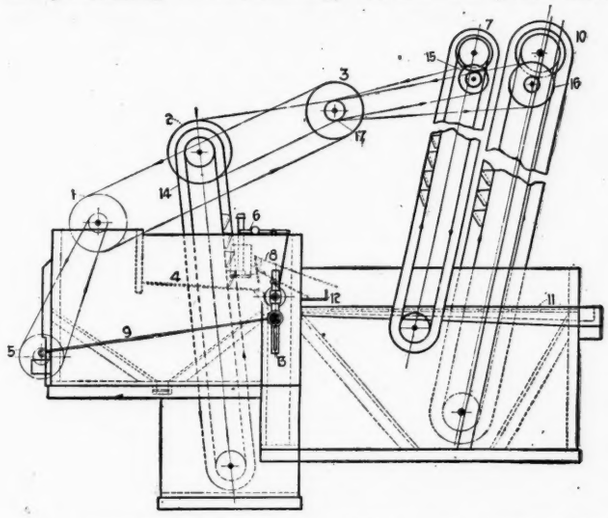


FIG. 3. SIDE ELEVATION OF A TWO-COMPARTMENT JIG

wrought marvelous changes in the practical application of this art. It was not long ago that the operator who contemplated building a coal-washing plant took on a real burden—more or less a nightmare, a vision of sprockets, chains, drags, elevators, belts, pulleys and shafts, to say nothing of leaking tanks, slop and mire; and all in such bewildering confusion that frequently it was difficult to crawl through it. But this was only the beginning. The first cost of such a plant was great, and the upkeep was still greater.

Contrasted with this, the modern coal-washing plant is an orderly, simple, highly efficient piece of construction. It is probably a fact that it does not contain over one-third the amount of machinery formerly used for handling a given tonnage. This is principally due to the fact that the flow sheet has been much simplified, the unit capacity of the machines tripled, and automatic appliances provided which guarantee highly efficient operation and uniform results. The suggestions that follow are designed to meet the emergency brought on by the war. They involve a still greater simplification, but without reduction in efficiency; and while the application is not universal, it will apply to a large majority of the operations where a better preparation of the slack and nut is demanded.

Let us assume that the problem is to wash 50 to 60 tons of slack coal per hour. Figs. 1 and 2 show a plan and cross-section of a jig with its refuse and washed coal elevator and its water circulation pump all in a self-contained unit, driven by one belt applied to a pulley on the main jig shaft. This machine has a jigging sieve 7 ft. wide and 5 ft. long. The jigging stroke is provided by two plungers acting in unison, and the refuse is removed by the automatic jig control later described.

It will be noticed that the whole apparatus, which has a capacity as stated above, is housed in a single tank construction. The jig tank, the washed coal dewatering tank and the refuse elevator compartment are all one structure, made of 2 x 6-in. lumber surfaced on all four sides and spiked down flatwise with all the corners and intersections alternately overlapping, and with two strands of candle wicking between each layer. These strands are placed both in the horizontal and vertical joints. That portion of the tank in which the jigging machinery is placed is further braced by heavy rods extending down through the tank construction, and across from side to side through the hutch in both directions, making a rigid, durable, leak-proof jig tank. The iron work alone on this jigging machine weighs about 13,500 lb. This does not include the weight of the elevators or the circulating pump.

The place occupied by this entire unit is so small that the building which covers it is correspondingly inexpensive, particularly as this building does not have to support the weight of any transmission equipment. The size of the dewatering tank for the washed coal, combined with the manner in which the water is removed from this tank for re-use by the overflow launder extending entirely round its outside, insures good settling effect of the fine coal and water for re-use in the jigging machine that carries little fine coal in suspension. The re-use of this water lessens the demand for a fresh supply to be added continuously to the circulating system. The amount of fresh water required is equal to the moisture in the wet coal and wet refuse as it leaves the plant.

These products, as they come from the dewatering elevators, will carry from 15 to 20 per cent. more moisture than did the raw coal when it entered the jigging machine. Hence, when, say, 40 tons per hour of raw coal is going through this plant, there will be consumed from 6 to 8 tons of fresh water, depending on the amount of moisture in the raw coal; or from

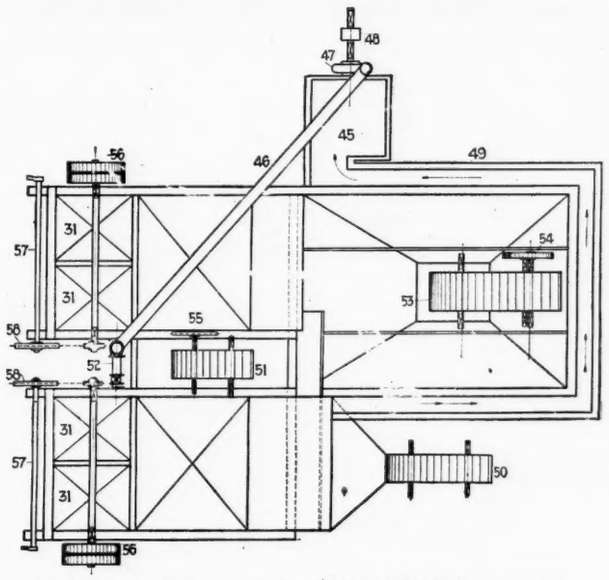


FIG. 4. PLAN OF A TWO-COMPARTMENT JIGGING MACHINE

25 to 33 gal. of water per minute. This amount of water can be provided at almost any mine without serious difficulty or expense. In many cases this equipment can be set up close alongside the tipple, allowing the slack from the screens to shoot directly into the raw-coal feed bin placed just behind and above the jig-

ging machine. Where the screens are too low to permit this, a short drag or belt conveyor will carry the slack on an incline and discharge it into the feed bin.

The equipment can be so set that the refuse and the washed coal elevator will discharge into bins over the main track, or the refuse can be taken to a convenient dump by a small car or other means.

The point to be emphasized is this: Here is a highly efficient automatically controlled coal-washing plant, having a capacity of from 400 to 500 tons of slack coal per day of eight hours. It is fitted with heavy and durable equipment, both in the jigging machine and in the elevators. This plant, even under present conditions, can be erected and put into commission at a comparatively small expense, can be operated by one man, yet its building requires the minimum of labor.

Let us now assume that the problem is to handle from 50 to 60 tons each of slack and nut coal. Figs. 3 and 4 show the plan and elevation of such a unit.

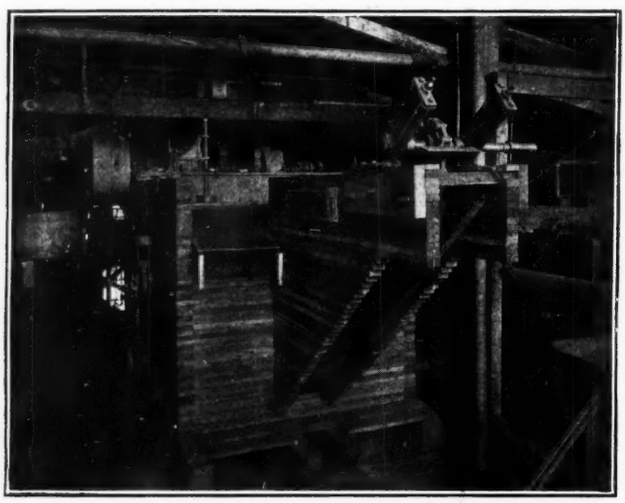


FIG. 5. COAL JIG TANK DURING CONSTRUCTION

The plan shows a two-compartment jigging machine, each compartment of which can be operated separately from the other, with a compartment between them containing the common refuse elevator serving both sides and discharging to the rear of the machine. The slack is taken care of in the same manner as provided in the first problem, by the dewatering washed-coal elevator set in the large washed-coal tank, the overflow from which provides the circulating water for jigging purposes, as mentioned above.

The nut coal, after passing with the water beyond the overflow of the jig, runs down over a perforated screen covering the entire width of the jig. Here it is dewatered and passes directly into the washed coal nut elevator, by which it is discharged into the washed coal nut bin over the railroad track. This elevator, because the coal is already dewatered, is not provided with perforated cups. It travels at about twice the speed of the washed coal slack elevator.

The water which passes through the overflow screen from the nut jig falls directly on the steel plate underneath, as shown. From here it is discharged into the cross-launder, which carries it into the slack dewatering tank, mingling with the water and coal coming from the slack jig. It will be noticed that any fines that may come over with the nut coal will go through the screen and into the slack coal, where they belong. In this manner, therefore, the nut coal is thoroughly rinsed and all fines are removed from it before it reaches the nut coal elevator.

This plant, although having twice the capacity outlined in the first problem, because it is built double, can be placed quite similarly; and inasmuch as the transmission equipment rests on timbers, which themselves are supported on the tank construction and all the equipment is driven from a single main shaft resting on these timbers, the plant maintains its unit construction and unit drive as before. It is, however, entirely flexible, each side having independent operation if desired, and each automatically controlled, insofar as the removal of the refuse is concerned.

Let the third problem be to handle from 100 to 120 tons of slack only per hour. The construction would be the same as indicated in Figs. 3 and 4, except that the washed coal elevator tank would extend entirely across the front of the two jigging machines. The washed coal elevator would have sufficient capacity for handling both sides of the machine, and the nut coal elevator would be omitted.

It is obvious that other sizes than those mentioned can be handled on the two constructions as shown, such as the nut size only on the first or on both sides of the second construction.

To illustrate more clearly the form of tank construction used, reference is made to Fig. 5, which shows only the tank of one of these jigging machines as it is being constructed in a large anthracite coal breaker in Pennsylvania. The view is taken from above, and the different layers which form the walls and partitions as they are spiked together flatwise are clearly revealed.

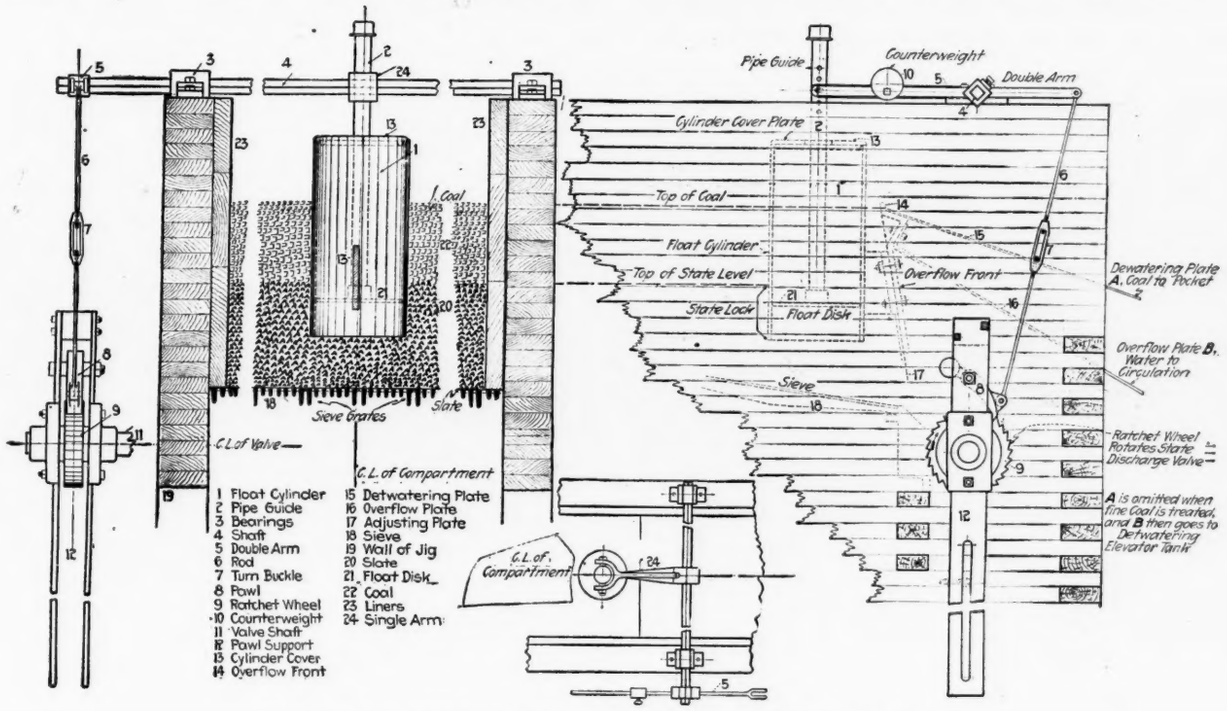
The history of the development of the automatic control for jigging machines would make interesting reading for one interested in the jigging art. It has taken fully a dozen years to bring it to its present simplified and highly efficient form. Beginning as a rather complicated, electrically controlled device, it is now built as shown in Figs. 6, 7 and 8.

Fig. 6 shows the section transversely across the jigging compartment, just behind the overflow plate 14, and directly through the float cylinder 1. Fig. 7 is the side elevation of the jig, showing that portion of the tank and equipment where the overflow plate, the automatic control device and the mechanism for actuating the refuse valve are located. Fig. 8 shows a plan of the jigging compartment.

To the overflow front casting 14 is bolted the float cylinder 1. This is 10 in. in inside diameter and about 24 in. high, open at both ends. The bottom end is placed at a distance from the jigging sieve of 3 or 4 in. below the level of the top of the layer of slate which it is desired to maintain on the jigging sieve. By slate, reference, of course, is made to all the refuse material that it may be desired to remove from the coal. On top of the layer of slate will accumulate the layer of clean coal, to a height and thickness up to the top of the overflow front 14, where the clean coal with the water used in jigging will overflow onto the plate 15. For treating slack this is made solid, but for jigging nut or coarser sizes is perforated, allowing the water to go through and accumulate on plate 16.

Inside the float cylinder is the flat cast-iron disk 21, carried at the lower end of the pipe guide 2. Attached to this pipe guide is the arm 24, which at the other end is fixed to the square shaft bar 4, carried in the bearings 3. At the end of this shaft, which extends out over the wall of the jigging machine, is the double arm 5. One side of this arm carries the counterweight 10 and the other end is connected with the rod 6, in such manner that it can lift the pawl 8. This pawl is a part of an oscillating mechanism mounted on the shaft 11, which forms the stem of the rotating valve for drawing off the refuse. This valve extends entirely across the width of the jigging bed, which in this particular machine is 7 ft. wide.

The construction of this valve is shown at 6 in Fig. 2. The refuse comes through the opening below the adjusting plate 17 and lies against the flights of this



FIGS. 6, 7 AND 8. DETAILS OF THE JIG CONTROL DEVICE

rotating feeder type of valve. As this valve rotates, the refuse is withdrawn from the jigging sieve and falls on a sloping board in the compartment underneath, whence it runs by gravity to the refuse elevator or other drag equipment for removing it from the jigging tank. The constant oscillating motion of the arm 12 is given by the crank and connecting-rod as shown in Figs. 1 and 2, the crank being driven from the main jig shaft by suitable sprockets and chain. Keyed to the valve stem 11 is the ratchet wheel 9.

It is evident that when the pawl is down and the arm 12 is oscillating, the ratchet wheel 9 is rotated in the direction of the arrow as shown, and that when the pawl 8 is raised and not allowed to mesh with the teeth, no rotation of this ratchet will take place, inasmuch as the bars 12 simply ride on the shaft 11 and are not keyed to it.

The automatic control of the rotation of the refuse valve is therefore entirely a matter of permitting the pawl to engage the teeth and rotate the valve whenever the level of the slate or refuse on the jigging sieve has reached the point determined as maintaining the proper thickness of this bed of slate, and conversely to stop the rotation of the valve and hence the withdrawal of refuse whenever the level of the top of the bed of refuse has been lowered to the desired point. This is readily accomplished by the equipment shown and in the following manner:

As the refuse accumulates on the jigging sieve, it will find its way up into the float cylinder 1 from the bottom end and will impinge on the bottom side of the float disk 21. At each stroke of the jigging plungers this float disk will receive a corresponding impact from the refuse as it is driven upward from below, and the whole structure of the float disk, the pipe guide, the arm and counterweight will have an upward and downward movement with a few degrees of angular rotation of the shaft 4. This upward and downward movement is conveyed to the pawl 8, which really oscillates on the bolt holding it in position between the arms 12. By adjusting the counterweight 10 to properly balance the effect of the upward pressure of the slate on the bottom of the float disk, an equilibrium is quickly produced by which this float disk is maintained at a certain level in the jigging bed. Whenever additional slate comes on the jig, the float disk will be raised within the cylinder, and this will lower the connecting rod 6 and permit the pawl to engage the teeth of the ratchet 9, instantly rotating the valve and removing the refuse through the orifice 17.

This lowers the level of the refuse in the jigging sieve and permits the float disk to sink to a lower level, when the pawl will again be lifted to a height not permitting it to engage the teeth of the ratchet, and the withdrawal of refuse will be instantly stopped. When nothing but clean coal comes on the jigging machine, or when the feed is entirely stopped, the pawl will

accordingly be entirely disengaged and no refuse will be removed. This condition is not temporary in nature, but will continue no matter how long the jigging machine is run.

It is remarkable how accurately this simple device controls the level of the top of the refuse bed in the jig. No matter how the rate of feed may vary, either in tonnage or quality, the level of the top of this slate bed is maintained almost at a given point throughout the entire shift, making it impossible for clean coal to find its way through the orifice 17, or for the refuse to accumulate in the jigging sieve high enough to go over the overflow plate at 14. Thus uniform products of clean coal and clean refuse are guaranteed. With the former methods of operating jigging machines these products depended entirely upon close attention given by the jig operator.

Formerly the jig operator's only method of determining the conditions in the jigging bed—that is, of knowing how high the slate level had accumulated—was either to run his arm down into the bed of coal and find the top of the level of the slate, or to use some device like a bottle on the end of a broom stick and by practice learn to determine this level by the "feel" as he lowered this bottle through the coal as the machine was being operated.

More frequently neither of these tests was faithfully practiced, and the regulation of the machine, insofar as the refuse removal is concerned, was controlled by his observation of the two products coming from it. Whenever slate was noticed coming with the coal, more refuse was withdrawn. Whenever coal was noticed coming with the slate, less refuse was withdrawn, and hence the adjustment of the machine was sometimes permitted to become entirely wrong before steps were taken to make it right.

With the automatic device, as here illustrated, the adjustment is kept correct all the time. The level of the slate bed is maintained where it should be throughout the entire shift, and this without the attention of an operator. This device is now in operation on hundreds of coal jigging machines, handling both bituminous and anthracite coal, and has proved its utility beyond the shadow of a doubt.

COAL CONVERSATION

Overheard Between Two Carloads of Coal in a Railroad Yard

A "Coal Age" subscriber has forwarded the following contribution, with the explanation that one whose ears are attuned to catch the conversation of inanimate things could have overheard the dialogue, which took place between two carloads of coal in a certain railroad yard not so many nights ago. We believe that Pennsy and Micky have uncovered a few truths that should be made evident to each miner and each operator. Every ton of coal loaded into a car should be loaded on honor.

"Hello, Pennsy, where are you going?"

"Don't know," answered the carload of coal addressed. "Where are you bound for, Micky?"

"Oh, I'm to help a lot of our boys get to France," and the load of coal in the P. Mc.K. & Y. car shifted proudly.

"Is that so?"

"Yes, sir."

"Did you pass all your examinations?"

"I sure did. I've been inspected, found O. K., and now I'm going over."

"So that's what makes you so bright and cheery, eh?"

"Yes, sir. I certainly am glad. But what makes you look so glum and downhearted, Pennsy? Are you sick?"

"No, I'm not sick. I'm just as strong and healthy as you are, but I've been rejected; and it's no fault of mine." What sounded suspiciously like a groan came from the direction of Pennsy.

"Well, then, what is the matter?"

"You know," answered Pennsy, "there's a kind of binder or band in me in my natural condition, and I'm sure I can't help that."

"Why, that shouldn't matter," responded Micky. "The same thing is true of me."

"No, it can't be the same," said Pennsy, "or they would have condemned you, too. They turned me down the first thing. How did you pass if the binder is in you?" he inquired curiously.

"Oh, it isn't in me now," answered Micky. "Before I was loaded into the car every bit of binder was picked out of me. I feel so much lighter now, and I know I'll burn much better. You see," continued Micky, after a pause, "that binder is a bad thing. It gets into the grate bars and clogs the grate, and it hinders the firemen from getting up steam. If Uncle Sam wants to get the Kaiser," wound up Micky, enthusiastically, "it is going to take the best that's in us."

"I wonder why they didn't treat me the same way," said Pennsy plaintively.

"Well, I'll tell you some of the reasons," answered Micky, waxing loquacious. "In the first place," he began, "the miner is trying to make all the money he can, and he's discovered that the more weight the more money——"

"Why don't the boss stop them?" interrupted Pennsy.

"Well, he is somewhat excusable," said Micky.

"How do you make that out?"

"You see," replied Micky, "if the boss says anything, the miner goes to another mine to work; so the operator says, 'Don't be too strict,' because he, too, is after the money. The more weight the more money," and Micky chuckled. "Another thing," began Micky; "the men are being rushed to make a large production, and of course the miners are not particular. In goes the binder, and you are condemned."

"Well, then," asked Pennsy, "why don't Uncle Sam get after those fellows? They certainly are not true to him."

"He is getting after them, but not strong enough. You see, Pennsy, Uncle Sam is asking the people to conserve food and substitute other things, so I think these fellows are trying to make dirt take the place of coal. Here comes the engine," he broke off, "and I guess we will have to part."

"Good luck to you, old man, you're going where you'll be honored; but as for me—say," he whispered, "I'm not alone in this. There's another load of coal that came from a stripping mine. You ought to see that."

Increased Production by Use of Modern Mining Machinery

BY MINER RAYMOND
Tiffin, Ohio

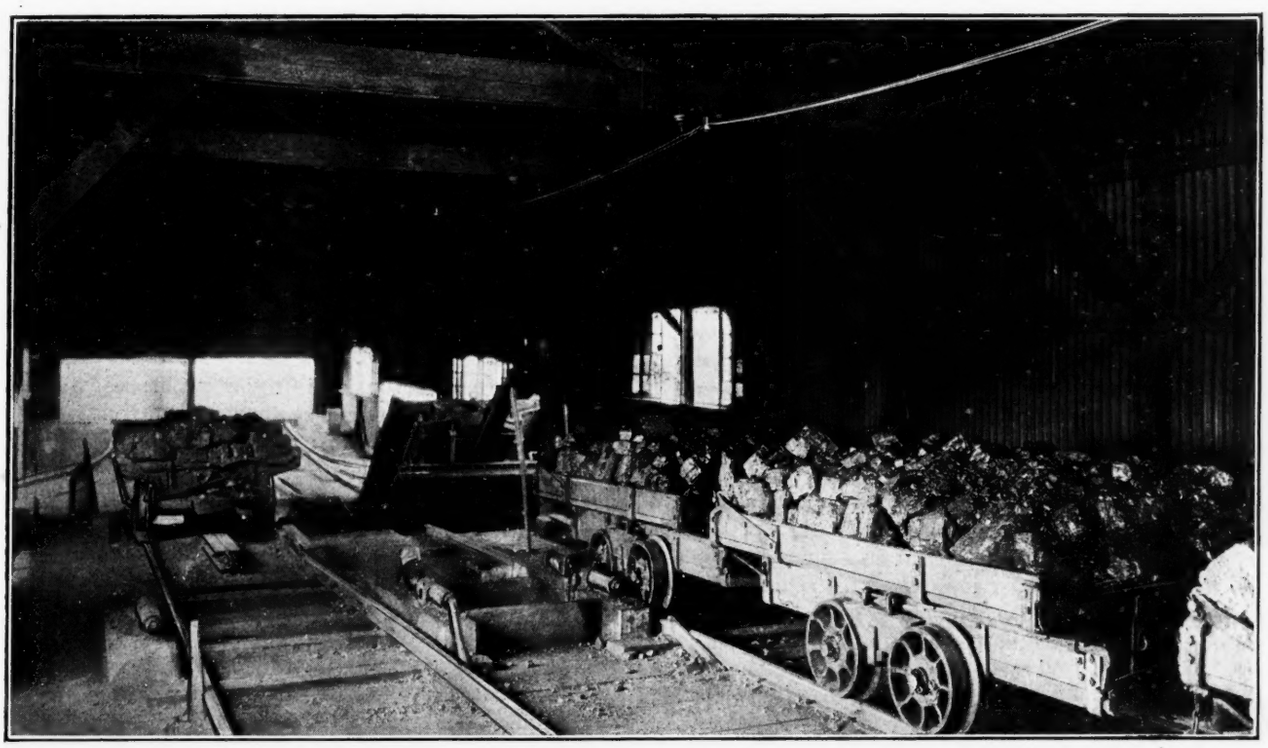


FIG. 1. LABOR-SAVING DEVICES AT TIPPLE—AUTOMATIC STOPS AND CROSS-OVER DUMPS

THIS article offers an opportunity for serving our country by giving some actual facts to prove that the installation of modern tipple equipment is of vital necessity to coal production, by assuring a greater coal tonnage with fewer laborers. The coal situation is one that materially affects every phase of our national life. The humble householder stores a few tons of coal so that his youngsters can warm their shins around the old "base-burner" before going to school on a cold winter's morning, and the question is equally absorbing to the United States Government, which must provide thousands upon thousands of tons for the bunkers of our ships whether they be the magnificent fighting vessels of our navy or the new cargo vessels whose keels first moved down the ways on the Fourth of July.

With this universal interest in mind, and facing the absolute necessity for a production of 75,000,000 tons of coal over last year's tonnage, and with over 100,000 miners who may be taken for military service, it hardly seems necessary to point out to coal operators that their patriotic duty is to raise the efficiency of all phases of coal production to the highest degree. Any neglected opportunity to raise productive efficiency by the installation of modern tipple equipment is an unpatriotic act no less than if the operators knowingly refused an opportunity to contribute of their means to the financial part of the Government war program, as expressed in Liberty Bonds and War Savings Stamps.

But there is another phase of the question which should not be overlooked in discussing matters of this sort. The increase of efficiency of production in a coal tipple yields benefit not only to our nation in its time of need, but also to the operator himself. It is almost beyond question that every mine owner, manager or tipple superintendent is interested in anything that would yield him profit, especially when the benefit is a direct contribution to the war plan; but still there seem to exist a few to whom proofs are necessary even when the benefits are so seemingly self-evident. In one case in which a plant owner was shown how the installation of a simple device could reduce his unloading costs by using only one man part of the time instead of two men all the time, he refused to purchase the equipment on the ground that he would not know what to do with the one man's time when the unloading device was idle Such a statement is hardly believable at a time when labor is so scarce in all lines of business, but it actually happened in June, 1918.

Taking the question from the selfish standpoint, with the knowledge that the selfish standpoint in this instance is of marked benefit to the national need, we find further excuse for adopting this program when the Government itself places a premium on prepared coal. Even before war times came upon us, the expressions of satisfaction over the increased efficiency of modern tipple equipment were so numerous that even a hasty collection of them

could easily make this number of *Coal Age* resemble a booklet of patent medicine testimonials. Analyzing such a collection would readily lead to the reduction of all methods of increasing tipple efficiency into three groups.

The first is the reduction in the actual cost of production by delivering the same tonnage with fewer men. Among many such examples there are found two which are typical. One of these is where an elaborate system of trackage was replaced by simple trip-handling equipment, including automatic stops and cross-over dumps, Fig. 1. Coincident with the starting of this new equipment five men were removed from the payroll. This was prior to 1916, and today these men could be put to work in another part of the company's property. In another case a single long flight conveyor costing less than $10,000 performs the work of six men who formerly cost the company, at the very least, $6000. The item of $6000 a year would pay the interest, upkeep and power consumed on an installation costing many times $10,000.

The second means of increased efficiency is the production of a larger quantity of coal at the same operative cost. Cases of this kind are perhaps the most numerous of any. There are many coal companies which, for years, worked a seam of good quality with their entire tipple equipment consisting of a simple dump, a set of bar screens and a couple of loading chutes. I know of one case where an installation of this kind was replaced with a complete modern equipment, including shaker screens and loading booms for the egg and lump. One hundred tons a day was the output of the old plant, while the new installation took care of more than 250 tons per day, with the same number of men in the tipple, and the coal produced commanded a greater market price. There was also a minimizing of breakage in the soft coal and a consequent increase in percentage of lump secured from mine-run.

This last part of the advantage gained in this particular case properly belongs to the third item of increased tipple efficiency, which mainly relates to the production of a higher quality from the same origin and with the same, or decreased, operating costs. It is invariably true that the better mechanical equipment shows results whose direct influence in high market standing yields fancy returns on investments and operating costs. This statement is made by a man who has visited and analyzed a large number of coal installations and has been familiar with the history of the trade for a good many years. One tipple superintendent who has been in the game for years, in speaking of his new tipple which replaced an antiquated structure, said of his tipple machinery, "With the use of it we are better able to prepare our product than ever before, with a minimum amount of labor."

One advantage of modern tipple equipment in the production of bituminous coal is the marked reduction of breakage, which is a direct result of the efforts of tipple designers along this line. At every stage of progress of coal through the tipple it has been the aim of competent engineers to avoid dropping coal; one of their most notable improvements was the introduction of the loading boom (Fig. 2) which carries the lump or egg into the car and avoids the fall which was an indispensable feature of the old-time curved loading chute. One mine owner writes: "We have been worrying for years over the breakage of block coal from the original chute. The loading boom wipes out any drop . . . there is absolutely no breakage."

These three roads to tipple efficiency are closely interwoven at every stage of tipple operation, and it might be of interest to follow briefly a hypothetical path of the coal through its various stages from the mine opening to the railway track. This is merely an imaginary case, but it is based on individual features

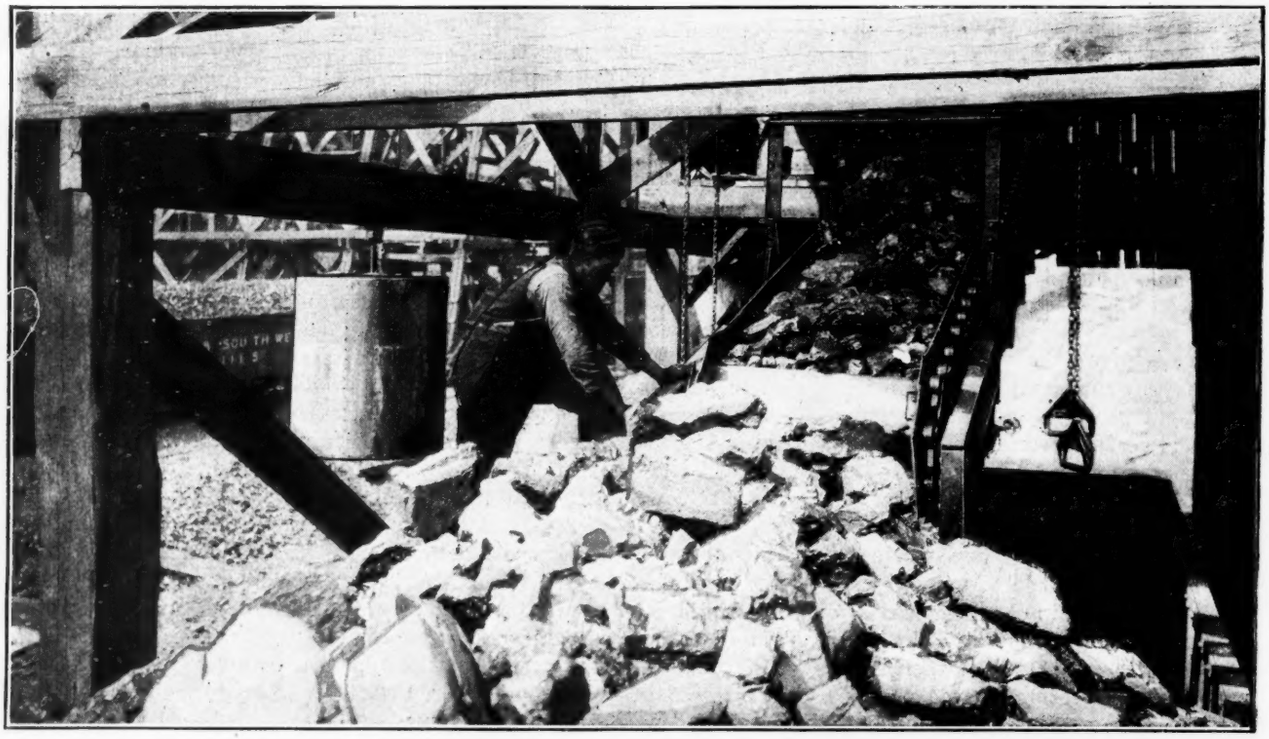


FIG. 2. BREAKAGE OF COAL AVOIDED BY LOADING RAILROAD CARS WITH LOADING BOOM

FIG. 3. CONVEYOR FROM MINE TO TIPPLE

common to many operations. Let us suppose that the mouth of the drift is high up on the hillside, with the railway passing at some distance away in the valley below. Beginning at the drift mouth, we find today that electric locomotives have replaced the old-time animal power.

At the dumphouse, at the top of the incline, there is a tripmaker and feeder with steel car haul and grades handling cars in quantities and at a speed impossible to even a large crew of huskies. A modern cross-over dump discharges the coal into the hopper, from which we find that the coal is no longer taken down a double-track incline to the tipple, but a modern retarding conveyor takes the load from the dump hopper and carries it down the hillside almost without attention, Fig. 3. In this one point—in the travel of the coal down the hill by the modern retarding conveyor—labor costs have frequently been more than cut in two. Of course, there are slopes too steep for retarding conveyors, but wherever they have been found practical they have dispensed with at least one man at each terminal.

In the tipple itself we find the retarding conveyor ceaselessly discharging its load into the hopper, from which an automatic feeder gives the screens a constant and steady flow. With the retarding conveyor there is no uncoupling or dumping of cars at this point and no laborious pushing the filled cars over the dump or pulling the empties out of the way. From here on, the shaking screens carefully remove all of the slack so that none is now carried over into the cars with the lump, as was formerly the case with the old bar screens. The coal is cleanly sized and breakage minimized by the careful design of screen slots and careful engineering in the driving mechanism, which assures a steady forward movement. The lump and egg travel to the cars over the loading booms, the advantages of which previously have been suggested, and before they pass down the incline into the cars all impurities can be easily and quickly removed on the picking table.

There are a thousand and one modifications of tipple design. These, of course, have marked differences from the outline noted. However, it is hoped that this will serve to suggest a few of the many points in modern coal tipple equipment which, taken together, constitute machinery's contribution toward the production of more coal and better coal with fewer laborers—a valuable contribution not only to the success of the operator himself, but also to the higher and better cause, in support of which a million of our boys from every walk of life have crossed the seas to fight.

Coal Carbonization

BY M. MEREDITH
Liverpool, England

The war has thrown many burdens upon gas engineers, not only on account of the great shortage of labor, but also by reason of the heavy demands for benzol, toluol and other products of prime importance in the manufacture of explosives. The gas engineer, in normal times, has looked upon his coal-carbonizing plant merely as a means of turning out the highest yield of gas possible per ton of coal treated; and whereas he has received considerable sums for his tar and oils, these have been mere incidentals in the one important business of gas production.

At the present time, while a high gas yield is of prime importance in order to meet the demands for gas for various purposes (which have multiplied and are still increasing owing to war conditions), yet many established practices have had to give way in order to obtain the required quantities of byproducts. High gas yields have been associated with low tar yields, for the tars have been degraded by high temperature, in order to convert them into gas of a permanent character.

At the Macclesfield gas works, as a result of careful and progressive experiments, and now of considerable extended commercial use, it has been found possible to increase the gas yield per ton of coal carbonized and at the same time obtain largely increased yields of tar and ammoniacal liquor. The latter is an important matter from an agricultural point of view, as artificial fertilizers are urgently needed. This result, the importance of which cannot be overestimated, has been attained by injecting steam into the base of the continuously operating vertical retorts, so that blue water gas is generated there. This high temperature gas, rising through the incandescent and also the partially heated coal, not only proves efficacious in removing the last traces of gas from the coal, but also distills or washes out the tarry matter contained in the semi-carbonized fuel before the tar has been subjected to the extreme temperatures which degrade it by destructive distillation.

The following comparative figures are illustrative of some remarkable results which call for further attention and study:

	Average for Year Ended Mar. 31, 1915	Test on Aug. 13, 1917
Gas made per ton treated	12,049 cu. ft.	15,477 cu. ft.
Calorific value—gross per ton treated	530 B.t.u.	508 B.t.u.
Coke per ton treated	13.6 cwt.	13.36 cwt.
Ammoniacal liquor per ton treated	25.3 gal.	32.68 gal.
Tar per ton treated	10.9 gal.	16.61 gal.

No deterioration in the retorts has been noticed as the result of steaming, and scurfing has been reduced to a minimum.

DEPARTMENT OF HUMAN INTEREST

Plan Your Town as Carefully as You Would Your Plant

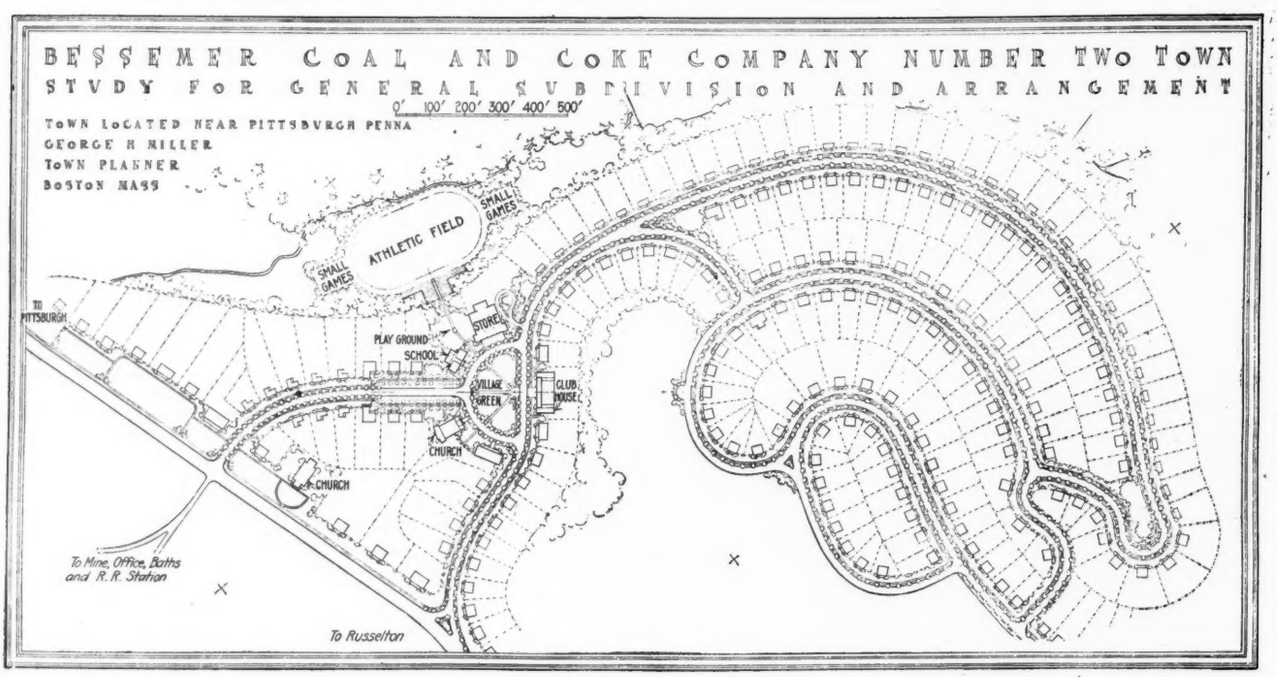
BY GEORGE H. MILLER
Town Planner, 6 Beacon St., Boston, Mass

Most mine owners decide for themselves how much money they will spend on a mining town, and in most cases that sum is just sufficient to cover the cost of the least number and least expensive sort of houses, the necessary water-supply and a type of outside toilets that will suffice. These, and possibly a company store, are constructed as quickly as possible in straight rows on the nearest available drained land, the mine is put into operation, coal is turned into cash and you have a mining town.

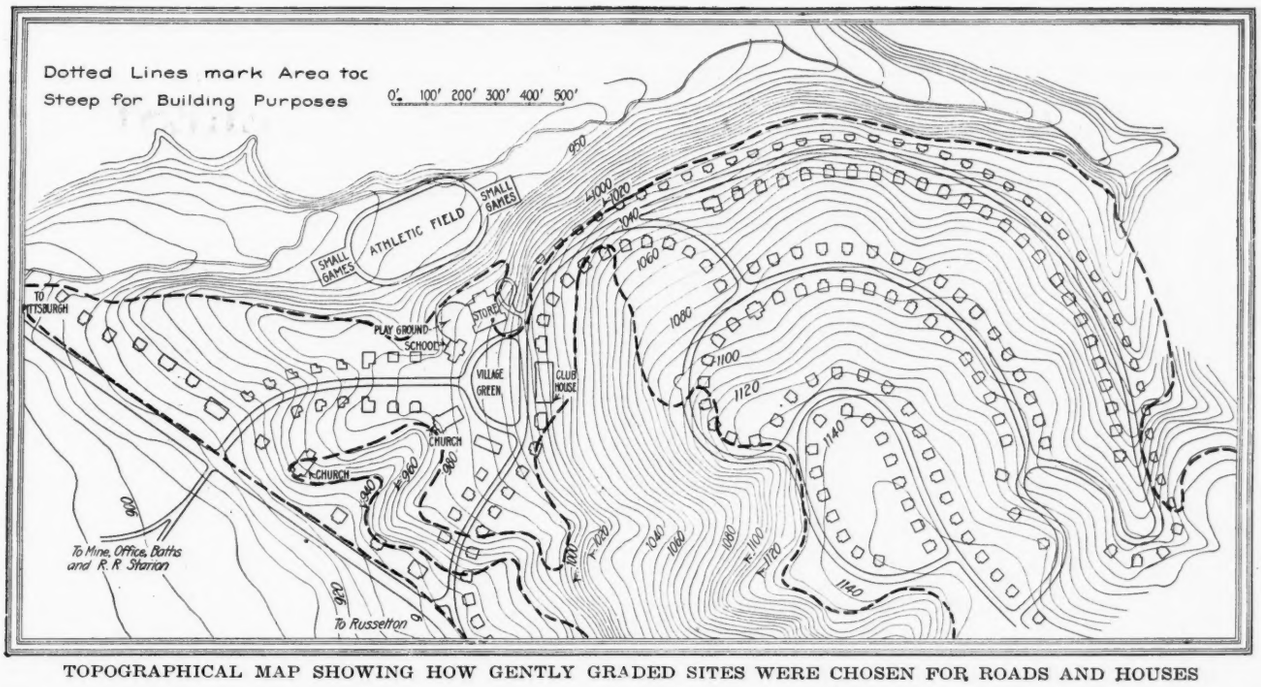
As time goes on and the mine pays, there often arises justification for the erection of a church. The owner listens to the representations of his resident officials and workmen, or himself begins to take a sentimental pride in the source of his income, and it is not unusual to see the church erected, and possibly a school, or both. Many are the club-houses now being built as afterthoughts, in old mining towns throughout the country, and here and there a hotel, playground and sidewalks, shade trees and groups of shrubbery are being added that were never dreamed of when the town was first built. Often, also, many additional houses are required for which sites are hard to find, and after these various features have gradually been developed in this shortsighted manner the eventual final aspect of the town as a whole is one of heterogeneous confusion and disorder —for things, architectural, mechanical and horticultural which are designed for domestic use invariably express the guiding motive by which they are planned.

To eliminate the wasted time, energy and cost of construction, use and maintenance resulting from this method of procedure and to gain greater economy, utility, convenience, safety and beauty in mining towns, it is becoming common-sense practice to study in advance some of the reasonable possibilities which the future may present. It is becoming customary to engage town planners who make a specialty of this work. They are asked to offer suggestions and advice based on their years of training, observation and experience, and to devote their faculties and talents to studying out these problems with some degree of nicety and foresight.

The town planner does not try to dictate what the town shall contain at the start; he does not try to influence the amount of initial financial outlay. He may be an idealist, but if he knows his business he is primarily an economist. He takes the conditions as he finds them and is guided by the wishes of the owner. His motive is to apply his experience and art to producing the best immediate and future results out of the crude material given him. The value of the town planner's service is in saving the misdirected efforts of the owner, his engineers and other officials, and in producing a more efficient town without increasing costs. There are plenty of examples even of the smallest mining villages which prove that such service is needed and succeeds.



A VILLAGE LAID OUT TO FIT BOTH NATURE AND THE NEEDS OF THE INHABITANTS



TOPOGRAPHICAL MAP SHOWING HOW GENTLY GRADED SITES WERE CHOSEN FOR ROADS AND HOUSES

The town planner customarily inspects the property, confers with the owner and helps to select the site of the town. Then he outlines the necessary surveys and how they shall be gathered, probably by the company engineers. Over the survey the town planner makes notes of his observations in the field and then prepares a study for general subdivision and arrangement of the town. The study is accompanied by a report completely defining all ideas represented therein, and with sketches showing the character of all cottages and other buildings and directions pertaining to their construction are submitted to the owner for criticism and suggestions, often at the outset being sufficient for execution under the oversight of the company superintendent or engineers. The cost of such studies is usually about one per cent. of estimated cost of construction, or from five to ten dollars per acre of land included in the study, the amount being definitely agreed upon at the preliminary visit of inspection. Detailed construction plans may be furnished by the town planner or he may act in advisory capacity only, passing upon all plans and keeping in constant touch with those who take in charge the routine of the detail work.

Buildings in a mining town which are public or quasi public by the nature of their use are the store, church and school, club-house, hotel, and possibly baths and office building, garage and a few better types of residences for officials and skilled men. The club-house as center for social and physical recreation may become the general community house, combining the functions of a hotel, club-house and baths or used in turn as school, church and theater. Some of these buildings may never be necessary, a thing that can be determined with considerable accuracy in advance, but when there is the slightest possibility that they may be called for in the future it is better policy to reserve desirable sites where they may serve their full purposes than be obliged to locate them in inconvenient, out-of-the-way places. It is desirable that most of these buildings be designed in one appropriate simple style of architecture with proper relation to each other, and be grouped in a formal arrangement about a central open space, or public square, thus creating a miniature civic center.

Community spirit may develop and justify outdoor recreation facilities, an athletic field with grandstand, a children's playground with apparatus, or a park comprising a waterfront or a tract of land which either affords views or is more valuable for beauty than for use. Most mining towns being in the mountains the first thing a town planner looks for in studying the general scheme of arrangement is a sufficient area of nearly flat land to be reserved for an athletic field and center of outdoor recreation. If there be only a limited amount of such land and it be appropriated for the first cottages built, just because that is the easiest way, then the idea of an athletic field must either be abandoned for all time or a site graded at considerable expense. The shape assumed by the area of flat land in a location convenient for a town center may suggest curved boundary streets on which cottages or other buildings are very attractive as seen from each other across the green. Flat spaces usually being comparatively low, although not necessarily damp, are often near the railroad or mine works, and therefore when used as a mine center are in the path of travel, and so naturally inviting and easy of access. The improvements at such a location and the activities taking place there can be made picturesque and interesting as seen from the encircling rows of houses situated on the surrounding hillsides.

It is seldom necessary or desirable that streets of a mining town shall be straight, or be arranged in gridiron fashion. When town sites consist of mountainous rolling land the streets should fit the topography with pleasing curves and easy gradients, and afford natural and attractive positions for the houses and other buildings. The streets should accommodate directness of travel and be located and designed for a given amount and kind of travel. Streets of this kind are less expensive to build, to use and maintain.

Two types of houses come under consideration in properly housing unskilled labor. First, there are houses erected solely to fill the needs of men with families, the most desirable kind of men in any village. Such houses should accommodate a single family only. They should be detached, semi-detached or built in groups, according to races of employees that are to be accommodated and according to the nature of the land to be used as a town site. Second, there should be dormitories or barracks for men without families, such buildings to have a mess hall, shower baths and other communal features and a separate and sanitary room for each man, however small and bare it may be. The most modest cottage can be given the aspect of a home if the same amount of thought is devoted to designing its appearance as to reducing its cost. The town planner knows the fundamental principles of cheap cottage design, the things that cost and the things that without extra cost make the cottage more useful, comfortable and attractive.

The modern mining town is built simultaneously with the mine works, and as the mining spreads and the employees increase in number, so also the community expands. In planning a mining town the layout of streets and alleys, the lines of all kinds of conduits and fences, the saving of top-soil surfaces for gardens, the placing of trees and other planting, the arrangement of all visible features, the scheme of a community center, and the location of houses of different types and outhouses, are designed on paper in advance of construction or growth and as one homogeneous and complete, correlated and compact scheme, provision being made in advance for later expansion. This is the procedure that makes physically possible the model mining town.

If We Would Be Safe, All Must Help

By S. D. Otis

Bay Shore, Long Island, N. Y.

In recent years much good work has been done toward making the mines of our country safe. But mine operators can never make their plants safe if the men do not coöperate with them. Mine operators, as well as all other employers of labor, are yearly coming to a fuller realization of the advantage of taking care of their men. They adopt safety devices of all kinds, provide good housing conditions and employ company doctors to safeguard the lives and the health of their miners. But in face of this work on the part of the operator, are the miners doing their share?

In many, many mines, I have seen evidence of the fact that while operators are trying to provide safeguards for their men, the employees ridicule and ignore these precautions and so make them of little value. There are several classes of men who busy themselves in undoing the good work that the mine owner tries to do for the safety of his men. About the worst of these tamperers is the would-be humorist who changes the meaning of warning signs and thus endangers not himself but his fellow workers, whom the signs are meant to warn against injury or death. By changing a few letters, here and there, these sign defacers produce an effect which they consider funny; but, on the other hand, by their action they make the safety signs useless.

I recently saw in a coal mine a good example of the defacing of a sign. The sign originally read thus:

DANGER! DANGER! DO NOT WALK UNDER WIRE

By marking out some letters and marking over others the sign was made to read:

GER MAN DO NOT TALK DER WAR

Clever? Yes, but criminal! The man presumably drew some pleasure from his smartness, but I wonder if that pleasure would in any way compensate him if he should see one of his fellow workers struck down by the electric current from that wire? Every mine has in it warning signs, but the real meanings of nearly all of them have been destroyed by thoughtless, misguided persons.

Another mine worker who endangers his own life and the lives of the men who work with him is the one, usually young and reckless, who plays tricks with the electric current in the trolley line. He stands on a board to partially protect himself and touches the trolley wire with a dampened newspaper. Any man he touches with his free hand receives a sharp shock, and the practical joker's happiness is complete. This trick may often do no harm, but there are cases on record where it has had fatal results for both men.

Yearly many men are injured and killed by falling in the way of a moving locomotive or of a trip of cars traveling down grade. Most of these falls are caused by sheer carelessness in crossing tracks. The victim trips on lumps of coal and slate left between the rails or falls when stepping negligently on ties and rails made slippery by the leakage of oil from cars. In mines where modern equipment is used, of course, this wastage of oil does not occur; but where old-fashioned cars are still in service extreme care should be taken to remove the dangers of slipping and of fires resulting from the presence of oil-soaked ties.

Serious fires and explosions occur in the most carefully watched mines because the men do not coöperate with the management in taking the most ordinary precautions. It does not seem possible that in a gassy mine practical mining men provided with electric lamps would carry and use matches, but I have seen the open flame of a match in a dozen dangerously gassy workings.

Any man who is careless in handling explosives should be classed as a dangerous person and not allowed to work with, or near, any kind of explosives. Recent articles in *Coal Age* have taken up in detail the proper methods of using all forms of explosive material, and such materials should be handled in absolutely no other manner than that so set forth. Saddened widows and cripples in every mining town can testify to the importance of using intelligence and care in working with explosives.

Mine operators and mine-operating companies should not cease in their efforts to make their mines safe for their men, but the men themselves can do much to help and much to hinder the good work. They should constantly guard against foolish, life-threatening acts and should make it unpleasant for any man who exposes them to danger.

Government to Operate Coal Barges

Coal-carrying barges are to be operated by the Government between the Alabama coal fields and the Gulf of Mexico. An announcement to that effect has been made officially by the Director General of Railroads. The transportation line in the Alabama coal service is to be operated in conjunction with the freight-carrying lines, which are to be put on the Mississippi River between St. Louis and New Orleans.

Coal already has been transported down the Alabama rivers to the Gulf in considerable quantities, but the opposition of the railroads and the inadequate equipment have retarded the development of water outlets to the Alabama fields. Since the coal can be handled into New Orleans on the same barges that bring it down the river, a large tonnage is expected to move by the new route as soon as regular service starts.

With the assurance which goes with a Government undertaking, Alabama operators will now provide the necessary terminal and handling facilities so that they will not be dependent entirely on railroad cars, the scarcity of which hampered their operations greatly last winter. The Government line will begin operation with existing equipment, but plans already have been drawn for improved barges and tug boats.

To Speed Up Movement of Coal Cars

Sluggish movement of coal cars, both loaded and empty, brought forth a formal order last week from A. H. Smith, regional director of the eastern district of the United States Railroad Administration. In the order, he declared it to be "of vital importance that our efforts be redoubled to secure an improved circulation of coal-loading equipment. This is of such importance that we feel justified in asking you to agitate this vigorously in all operating offices so that we may be able to make a suitable improvement."

No Coal for Use of Country Clubs

Wood apparently will be the popular fuel at country clubs this winter, as a result of an order from the Fuel Administration forbidding the use of other fuels for such places. The order is not absolute, as the Fuel Administration will issue licenses of exception when the state administrator will certify that the fuel can be spared and that it is not against the public interest to grant such a permit. Peat is included with wood as a proper fuel, when neither requires the use of railroad transportation facilities.

Permits Small Shipments of Steel for Essential Civilian Uses

To avoid delays in the filling of small orders of steel urgently required for essential civilian uses, the War Industries Board has decided to permit shipments which are not in excess of five tons without request for priority. This is expected to relieve the coal-mining industry of much annoyance, as a considerable portion of their needs for iron and steel products is in small lots.

Appoints District Representatives

J. D. A. Morrow, on his recent trip to the West, appointed the following district representatives: George D. Kimball, Denver, for Colorado; J. Van Houten, Raton, for New Mexico; W. B. Innes, Great Falls, for Montana; Moroni Heiner, Salt Lake, for Utah and Wyoming. Mr. Heiner will be assisted by A. D. Pierson, of Salt Lake City, who is the assistant district representative for Utah, and by D. H. Pape, of Ogden, who is assistant district representative for Wyoming.

Inspection Leads to Coal Conservation

One week's inspection of power plants at Pittsburgh resulted in the conservation of 81,000 tons of coal, according to a report to the Fuel Administration made by Thomas R. Brown, the administrative engineer for the Pittsburgh district. State administrative engineers have been appointed as follows: H. J. Meyer, Minneapolis, for Minnesota; Henry Adams, Baltimore, for Maryland, and Horace S. Hunt, Jackson, for Michigan.

Weekly Production Statistics

Production figures for the week ended July 6 are as follows: Bituminous coal, 10,259,000 tons; anthracite forwardings, 31,493 cars; beehive coke, 579,000 tons; byproduct coke, 502,666 tons. With the exception of byproduct coke, production in each case shows a marked decrease as compared with the preceding week. This is due almost entirely to the observance of the July 4 holiday.

Quite contrary to expectations, the average production per working day, during the week under review, held up to the high average of the week before. This was made possible by the return of practically all operatives on July 6. In previous years it has been difficult to obtain more than half of the daily average production

on the day following July 4. Anthracite shipments fell off 25 per cent. as compared with the week preceding. This was larger than had been anticipated.

The average production for the five working days of the week at the beehive coke ovens fell off sharply during the week under review. In the principal Pennsylvania producing districts, which had an output during the week of 348,178 tons, 20.6 per cent. of operating capacity was lost due to the shortage of yard labor. Both coal and coke cars were available in quantity. Despite the holiday, the byproduct output continued to forge ahead and now has passed the 500,000-ton mark. The ovens are operating at more than 90 per cent. of maximum capacity under ideal conditions. The principal loss of output was due to repairs to plants, with labor difficulties ranking next.

The figures referred to in the foregoing are estimates made by C. E. Lesher, the geologist in charge of coal statistics for the United States Geological Survey.

Necessity of Conserving Coal

Nothing less than the vivid realization that the coal situation this winter threatens to be more serious than was the case last winter caused the Fuel Administration to take the drastic step of cutting off all fuel from breweries. While the coal supply available for use this winter will be intelligently distributed and no recurrence of the confusion of last winter will take place, the requirements of the war industries are mounting so fast as to make it clear that there is not enough for all.

The work of supplying the domestic consumers is going ahead more rapidly than had been anticipated, and there will be no inconvenience on the part of householders if they practice conservation. The Fuel Administration is being given prompt coöperation by the consumers, who now are reporting their requirements. This information is being tabulated as fast as received and is giving a more intelligent view of the situation.

It was not the cutting off of the fuel from the brewing industry which has caused the concern throughout the country reflected in every mail to Washington, but it is the uncertainty as to how far this policy will extend. Some are anticipating that 50 per cent. of the non-war industries will be down before spring from lack of coal. The Fuel Administration is indulging in no predictions as to what will happen to the non-war industries, but every effort is being made to bring to the attention of the public the necessity of conservation.

The incident which precipitated the brewery order was an announcement from the Railroad Administration that 200 additional carloads of coal could be handled through the New England gateways each day. New England's schedule already is much behind, but so closely was the consumption following after production that it was found necessary to divert supplies destined for non-war industries in order to fill the 200 additional cars each day.

Each industry is to be studied by a committee headed by Clarence M. Woolley, so that curtailment can be made in the most intelligent manner possible. The other members of the committee are Edward Chambers, P. B. Noyes, Theodore F. Whitmarsh, Edwin B. Parker and Edwin F. Gay.

Limits Use of Gas Coal in Northwest

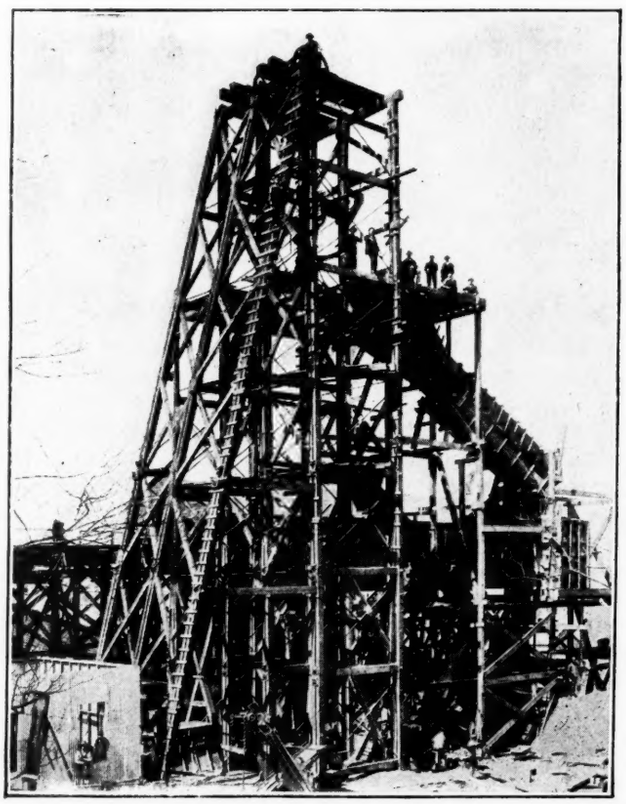
Gas coal moving into the Northwest must be distributed only to manufacturers of gas and to operators of byproduct coke plants. An order to this effect was made necessary on account of the fact that gas coal was being used for other purposes, when the greatest difficulty is being experienced in procuring ample supplies for byproduct coke ovens and gas plants which supply domestic users.

Brief Washington Notes

An entire floor of the new Commercial Bank Building, Washington, D. C., is to be occupied by the National Coal Association. One of the features of the new offices will be the directors' room. It will be large and particularly well furnished.

J. D. A. Morrow, S. L. Yerkes, A. W. Calloway and J. B. Neale, of the production division of the Fuel Administration, attended the operators' meeting at Fairmont, W. Va., to confer with regard to the best manner in which the coal from that section can be distributed.

Evans Woollen, federal fuel administrator for Indiana, is to have charge of the Bureau of State Organizations of the Fuel Administration during the absence of Walter E. Hope, who has been compelled to return temporarily to his office in New York.



HEADFRAME OVER NEW SHAFT OF CONNELLSVILLE BASIN COKE CO., ROCK FORGE, W. VA., BEFORE COMPLETION

The structure is of timber, 95 ft. high, and handles coal into the shaker and breaker of the old tipple in the background. The old tipple still serves the drift mines, but ultimately all the coal will come through the shaft. The shaft is 130 ft. deep, and concrete lined throughout. It is 10 ft. 10 in. by 24 ft. in the clear, with three compartments, two for hoisting and one for air, pipes, etc. The cage guides are bolted to the steel I-beam buntons.

THE LABOR SITUATION

EDITED BY R. DAWSON HALL

General Labor Review

Provost Marshal General Crowder denied on July 17 that a special order had been issued placing anthracite workers in a deferred classification for purposes of the military draft. In denying a contrary story that had appeared in the Washington press he said that no change had been made. The matter is still left to the discretion of the local boards. He understood that these boards were placing coal miners in deferred classes.

The other news regarding labor seems this week to center around prohibition. Suddenly in the country over national abstinence is being talked by people who have not been given to discussing it hitherto—at least not favorably. The National Coal Association advocates this war measure in a communication to Dr. Garfield. There is no temporizing in its statement; it wants prohibition to be nation-wide; it wants it to be complete and it wants it now. It is the dryest of bone-dry legislation that it would have passed. One feels that in a week we have progressed a whole decade.

PROHIBITION WILL INCREASE NATIONAL WELFARE

This action will so ameliorate the condition of the working population that the workingmen will never cease praising the union for what it has done for them, just as they praise the union for the greater earnings that come from mechanical appliances, for the fatter pay envelope that comes from a depreciated currency and for the greater comforts that come from the inventor's ingenuity. All that ameliorates or even appears to ameliorate the wage earner's lot is credited to the work of the wage earners' tribunes, whether they oppose these ameliorating influences or support them.

But this we must concede: Frank Farrington, big-souled Frank, is out for prohibition. If the measure goes through the mine workers have a right to thank him. How he can come from Streator, Ill., and yet advocate prohibition, passes explanation, but we are told, nevertheless, that he does.

INDEPENDENCE DAY WAS THE ONLY WORKDAY LOST

Undoubtedly prohibition is the nation's best bet in peace or in war, and especially in war. It will add immensely to our production, and therefore to the booty which the people of the nation will yearly divide. Nevertheless one can hardly concede that this year's Independence Day celebrations were so harmful as has been represented. The nation only lost one day's coal. The figures of the United States Geological Survey show that in the other five week days more than an average production of coal was secured. The week's output of bituminous coal was 10,259,000 tons, or 2,052,000 tons per working day. There is little evidence that the drunkenness and abstention from work on July 5 exceeded that on a normal day. If it did, the coal output must have been made good by patriotic miners who tried to make up for the idleness of Independence Day.

James B. Neale, director of production of the United States Fuel Administration, visited northern West Virginia last week and made addresses to the mine workers at Monongah and to the coal operators assembled at the Fairmont Country Club. There was a little note of reprimand in his address to the operators. As we have said before, the operator is being asked for things, possible and impossible; the mine worker for something he can unquestionably provide, namely, 8 hours' work, 6 days a week. However, some of the things the operator thinks he cannot do can be done if he feels sufficiently distressed about the matter to be willing to do the necessary scheming and contriving. Some operators are not any too observant as to the difficulties that confront the mine worker and are a little too close in providing supervision, adequate repair force and adequate supplies.

Attempts are still being made to show that the anthracite operators are trying to reduce the number of their employees. We are told for instance that 11 employees engaged in the construction of a new breaker at Woodward colliery, of the Delaware, Lackawanna and Western Railroad Co., at Edwardsville, were laid off on July 11. With the suspension of these 11 men, we are told, the number of idle men, presumably at Edwardsville, is increased to 103, for 92 were suspended by the company several weeks ago.

The men thus laid off had been asked to work Sunday so as to bring the work to a speedy conclusion. They consented, believing, it is said, that double time would be conceded them. On inquiry they found they were credited only with a day and a half. The men objected and with one of the firemen on the job went to Scranton where, following a conference with the superintendent, they were paid off and discharged.

These men were probably not mine workers. Their discharge, therefore, is not the discharge of a mine employee. If they were mine workers they were demanding something to which their contract did not entitle them. Their idleness would therefore condemn themselves and not the company.

The Central Pennsylvania Coal Producers' Association has been preparing a report on the number of miners, cutters, scrapers and loaders employed in May of this year as compared with the number working in March of last year. The purpose is to make the fact deduced the basis of an appeal for deferred classification of such mine workers as are subject to draft.

WASHWATER CAUSES A STRIKE IN PENNSYLVANIA

The Pittsburgh or western Pennsylvania district has had few, if any, strikes of late, but about July 8, 200 of the mine workers of the Arnold City No. 2 plant of the Pittsburgh Coal Co., located at Arnold City, Fayette County, went on strike to obtain an adequate water supply at the company houses. The company made an agreement last September with the Fayette City Water Co. to supply water, but whenever the water is low the water company shuts off the supply. State police were brought in to maintain order and eventually water barrels arrived. Washday needs being thus provided, the strike came to an end.

The troubles which, in the anthracite region, have doubtless justified the laying off of men are well illustrated at the Tuxhorn bituminous mine in Illinois. Men make it impossible for the employer to retain them. Sometimes they refuse to accept union wages or recognized union working conditions, and then as soon as they are idle they begin to bemoan the lack of patriotism of the men who for good and sufficient reason were compelled to put them out of their employ. In the Illinois instance the men quarreled violently among themselves, the foreigners refusing to allow the negroes dominance in the union. As a result the men refused to work. When at last they decided to get busy the company refused to admit those men to the mine who had been leaders in the near-riot that had occurred. The company will take the matter up with the union and if it is agreed that the men should be reinstated that will be done and the time lost by the men thus reinstated will be paid by the company. There are some men who are such trouble makers that a mine can produce more coal without them than it can with their so-called assistance.

The employees at the mine of the Railroad Mine Supply Co. at Kincaid, near Taylorville, Ill., walked out on July 1 and the mine has been idle ever since. The strikers declare that they walked out because 10 machinists were laid off when they demanded an increase in pay.

Strikes to compel better railroad service have not come entirely to an end in the state of Indiana though they are not as frequent as they used to be. One occurred recently and the details will be found interesting:

Three coal mines, on a branch of the Indianapolis and Vincennes R.R., producing approximately 3600 tons of coal a day, and employing 670 men, were made idle by a change in the schedule of a miner's train. Most of the men employed at these mines reside at Linton. The mines are a part of the Vandalia Coal Co.'s holdings. For a number of years the miners have gone to and from their work at certain hours traveling on the Indianapolis and Vincennes R.R. A few miners who live at Dugger, however, petitioned the railroad for a car to be placed on the switch in the morning and brought back in the evening. After this petition was granted it was necessary to start the miners' train from Linton 15 min. earlier in the morning and to schedule the train to arrive 15 min. later at night. The Linton miners objected to the change and refuse to work until the old schedule is restored.

The coal production of Alabama is steadily increasing, a pleasing outcome of the many appeals recently made to the miners of that state. Men who have been in the trenches, men who are now working for the Government in shipbuilding plants and in other war industries, have visited the Birmingham district and the mining sections of Alabama in large number during the last 15 days. They have addressed the workers and urged them to give the Government the benefit of their full labor, stressing the fact that fuel is one of the most essential elements in the present war crisis. Coal, coke and iron men state that while the mine production is not yet as great as is attainable there is much improvement in the output. The past week saw a larger production of coal than the previous week and the belief is general in the Birmingham district that the mine workers will from henceforth continue their efforts to keep the output at a maximum.

Much Impressed, Rust Men Work on Sundays

Even if the miners work six days a week and the full capacity of the mines is reached it is feared that the production will still be short of requirements. The demand for coal is the heaviest on record and it has been steadily increasing so that now the increase in the demands in the Birmingham district is practically double the increase in the rate of production.

George Gordon Crawford, president of the Tennessee Coal, Iron and Railroad Co., speaking during the week before a meeting of the mining interests of Alabama assembled to discuss coal production under war conditions, reported that this company broke all previous records for production at its mines on Monday and Tuesday of last week. According to Mr. Crawford, 14,000 tons of coal were produced on these days and that is 1500 tons a day above the average production.

The miners and other employees of the W. C. Rust Coal Co., operating the Sligo mines in Etowah County, are putting in seven days a week at the mines. Mr. Rust in reporting the increased production stated:

"Our miners upon learning the general need for coal voluntarily offered to work on Sundays if permitted to do so, hoping thereby to relieve, in a small way, the demand for increased fuel production. The offer was immediately accepted and our mines are now operating at capacity even on Sunday. We are in need of cars to transport the coal thus being mined."

Nation's Coal Men for Prohibition

The bituminous coal industry of the United States has during the war put itself squarely behind the prohibition movement. At least operators, representing 400,000,000 tons output annually, have so placed themselves recently, for the National Coal Association has memorialized the United States Fuel Administration to support measures for immediate nation-wide prohibition. This resolution was transmitted to President Wilson and published for public information July 12.

The operators in the Association are anxious for speedier action than is meditated in the Gore amendment. Why wait till there is an immediate coal famine to put in force the means to relieve it? We know we are going to be short of coal this winter. Let us not wait till winter comes and then at that late hour make belated and therefore inefficient provision against the shortage. All things considered, is not the summer when cars are plentiful the time to cut down drunkenness? When cars are scarce, as in winter, it really does not matter so much. Besides, in winter the stories of the shortage brace the miner; and in summer there is less to brace him, and liquor gets the best of his feeble will—reference being made alone, of course, to those who drink to a degree that interferes with their work.

Operators View the Saloon in a New Light

The mine operators have at times past been indulgent toward the liquor business, some feeling that a saloon brought men to their mining town and that prohibition would stop the flow of foreigners to America. It may be conceded that liquor does attract some men to the town where it is sold. But the operator would be better off without such men, especially in these days of division of labor, when one man's drunkenness muddles the whole mining game; for sober loaders wait on drunken cutters and sober cutters wait on drunken loaders, and both are waiting on drunken scrapers.

With national prohibition all mines will be on the same basis. The measure may conceivably prevent foreigners from coming to America, but surely only the intemperate kind. These we do not want after all. The foreigners we have seem to stay well in West Virginia without their liquor. That state does not regret the sobriety so far as it has gone. Instead it wants more. So the foreigner is not much repelled by prohibition, and if he were he can't leave now; nor can he just now be induced to come. It is more important, therefore, at least at the present juncture, to remove from him all that interferes with his work.

Let us quote at some length what the National Coal Association has to say, for it is grateful news after these years of dubious shifting on this momentous question:

"Regardless of political affiliations of the members of the association, and leaving out of consideration the moral issues involved, and basing its opinion entirely on economic and patriotic grounds, the committee unanimously and unqualifiedly believes that national prohibition for the period of the war is absolutely necessary to make effective this or any other plan for increased coal production. A comparison of the records of production of mines in wet and dry territories furnishes ample proof of the need of prohibition. The various instances cited to you today need not be repeated here, but they typify the experience of operators throughout the entire country."

"Our committee," said Chairman A. R. Hamilton, "is composed of practical operating men, representing all the principal producing districts of the country. They are men of all shades of personal opinion. Some come from wet states, some from dry states and some from states partly wet and partly dry. They all told their stories and presented their figures to show not only the relative efficiency of the mines as between wet and dry states, but the difficulties of working out any practical benefits from drink restriction along the border line between wet and dry territory. The result was a determined and unqualified stand for national prohibition.

"The committee feels that the drinking evil has become so rampant in the mining communities that its complete elimination is fundamentally necessary in the effort to speed up the mines sufficiently to get the 100,000,000 additional tons of coal this country will require this year. It is now up to Congress to make a clean-cut choice between booze for the mining communities and coal for the war and the public."

EDITORIALS

Housing in the Mining Regions

THE draft does not cause houses to be vacated, provided that business continues with pre-war activity. The families still remain, though the boys go to the front, and just as many houses are required to accommodate the percentage of working men who remain. The anthracite region has lost over 18 per cent. of its men since the war began. This represents the net loss. There has been a larger shift of labor than this loss represents. Let us suppose that only 75 per cent. of the force now at the mines represents what was there before the war or has been gathered from nearby homes. Then that 75 per cent. will require practically 100 per cent. of accommodation. The 7 per cent. must have found dwelling quarters for the most part in new houses or in houses previously vacated.

More men will be required to bring the force up to full quota, to make up for the inefficiency of the new men and to correct possibly the slackness of those who find they can secure the income they desire without steady work. To bring them in more and better houses must be built. The outcome will be satisfactory, and more perhaps than we can ever hope for, if the anthracite region can manage to get its full pre-war force by housing the men in dwellings 25 per cent. more numerous than sufficed before the war began.

For this reason the anthracite and bituminous regions alike can look forward to an era of building and improvement despite the high prices, the shortage of labor and the desire to keep expenditures strictly on a war basis. The coal companies moreover have now the money and inclination to make improvements wherever such work will secure and retain labor.

From the Schuylkill district of the anthracite region comes word that the Philadelphia & Reading Coal and Iron Co. at Beaverdale is placing electric lights, water and other conveniences in the houses occupied by its employees. New kitchens and porches have been added to the houses; the surroundings have been beautified. The rent is placed at $7 per month. The city dweller finds such a rate hard even to imagine much less secure. But even in the immediate locality prices like these are unusual. At Mount Carmel nearby houses no larger, better or more convenient are renting at from $12 to $15 per month.

Three other villages of the company are getting generous renovation. Concrete walks now being built make traveling easy, the windows of the dwellings are being enlarged, and electric lights and a water-supply in every house bring the village up to date. No longer do ten families "tote" their pails to a faucet or even a well on the street, as used to be customary in mining villages.

The anthracite companies, anxious to aid war gardens, are placing their land at the disposal of their tenantry and give one and all fertilizer from the colliery stables free; sometimes they even deliver it at the garden site. As a result of these actions and the need for houses, the tenant houses once idle are now occupied. Formerly out of repair and indifferently cared for, they are now homes of happy workingmen. Many new blocks of houses are in contemplation. The war, by accentuating the need for men, is almost sure to set new standards for housing. Neither tradition nor romance will ever nestle in a row of houses of the store-box type of architecture, and no one will ever make a home of any permanence where there is neither tradition nor romance.

Improvement in Illinois Mining

WHILE all interested parties to the proposition of greater recovery of coal in Illinois agree as to the necessity for further action, the steps which should be taken to secure it are not so evident. The chief obstacles now are the adoption of improved systems of mining and a modification of the contract between miners and operators, to enable a greater extraction to be made.

Much individual effort has been made to devise systems of mining which shall improve existing methods. Also state and Federal bureaus plan at an early date a more extended investigation of Illinois mine workings with reference to the cost of production and the percentage of extraction. The claim is made that mines are not opened up in the first place looking to big recovery of coal, and plans are now being formulated to leave larger pillars on the advance of the workings. Also, engineering skill is being sought more and more by operators to assist in planning underground work and to follow up the development along the lines laid out. Furthermore, mechanical appliances are coming rapidly to the front to enable more work to be done with fewer men. To secure greater extraction as well as safety, an entry-driving machine has been devised to permit of reaching the boundaries quickly and encourage a system of retreating rather than of advancing, as at present. Such a machine is now being tried out by one of the prominent coal companies in the southern part of the state.

But the leading suggestions and plans just noted are details. The proper channel for further extensive improvement is the Federal and state coöperative movement which has been working so effectively. The final solution seems to be a line-up of four factors: The state legislature, the mining bureaus, the miners' union and the operators. The freight carriers of the state are also vitally interested; the loss of coal may affect them even more than the operators. The latter can go to other fields and open up new mines, but the usefulness of a railroad may be destroyed in some cases with the exhaustion of coal in its territory. As illustrating the relative importance of coal mining and agriculture in Illinois, we only have to turn to reports for 1916 which note that about 30 per cent. of all freight

carried by the railroads of the state during that year was coal, while farm products are only half as large.

The present, however, would seem to be no time to experiment on new systems, unless they will fit in with existing methods. There is a general shortage of labor and a threatening scarcity of coal, and no interruptions to production would be tolerated. Today any change which would curtail output or cause unrest among miners would not be favorably received; on the other hand, during more normal times, the leading coal interests of Illinois would welcome suggestions which gave promise of relief from present conditions.

Low extraction has been laid at the doors of the mining men of the state, but judging from the numerous examples of fine modern plants throughout Illinois, the suggestion arises that the question of surface protection might be one if not the leading factor in the problem. If some one will explain how to handle the surface, the operators may do the rest.

American vs. British Ideals

AT A TIME when the British are our allies, it seems perhaps importune to call attention to the difference between the business ideals of our respective countries; but seeing that there is a tendency toward certain of these ideals in America, and a tendency toward American ideals in Great Britain, it is perhaps well to consider what they respectively are.

In Great Britain the individual seeks a place in a large commercial house, expecting to live and develop with it and rise slowly and steadily with the advance of the years. The house engaging a man does not take him on trial; it expects to keep him as long as he lives. The manager looks up his antecendents, inquires into his family, studies his record and finally makes the important decision whether to accept him or not. In fact, the selection may antedate by months or years the actual entering of the applicant into the "berth" thus filled.

Recommendations from the distant and interviews with the near precede the employment of a man in any business office. The employer is not hiring a helper, he is buying his services for a lifetime on progressive partial payments. The employee is buying a slowly ascending annuity and paying for it in partial payments of service.

This used to be recognized so fully that it was unlawful to induce workers from one firm to accept service under another. But both employee and employer feel in large manner bound to one another. Theirs is no day-to-day contract. The law may say it is, but custom decrees otherwise; and customs are larger than law.

In Great Britain the employee goes forward in the company with the progress of his years and experience, whereas, with us, leadership does not merely come as a reward of seniority. Nor, it is true, does it solely so come in Great Britain. But in that country, nevertheless, as has been said, men enter a company in early youth and usually remain with it till they retire, climbing in it and with it, giving their lives in its promotion and development, regarding it as the end-all and be-all in their existence. The company feels morally bound to take care of these men. Only in cases of the grossest, most inexcusable negligence or malfeasance is a change made. To drop back in the line of progression is considered clear evidence of incompetence. Men do not shift from company to company. New blood is not sought; old blood is not rejected.

In fact, to express matters in American terms, Great Britain is a country where civil service rules dominate business as they occasionally dominate political service in America. The United States, almost without intending it, is drifting toward the British benign system of seniority and precedence, and away from the American system of the leadership of the fittest.

There are benefits in both systems. On the whole, we prefer the American plan. We believe it has vitalized our industries and that the contrary system has had a discouraging effect on British business. Men never leave a British company. They wait till the undertaker's horse removes those who precede them, and they step into the place thus left vacant—decently, of course, but none the less surely. They regard it as a wrong when a place thus left vacant is filled by any man outside the order of precedence, unless indeed he is related to a senior partner.

We have perhaps altogether too much turnover in our American executives. Too many corporation heads have a disposition to fill vacancies from outsiders they do not know rather than from insiders whom they do know.

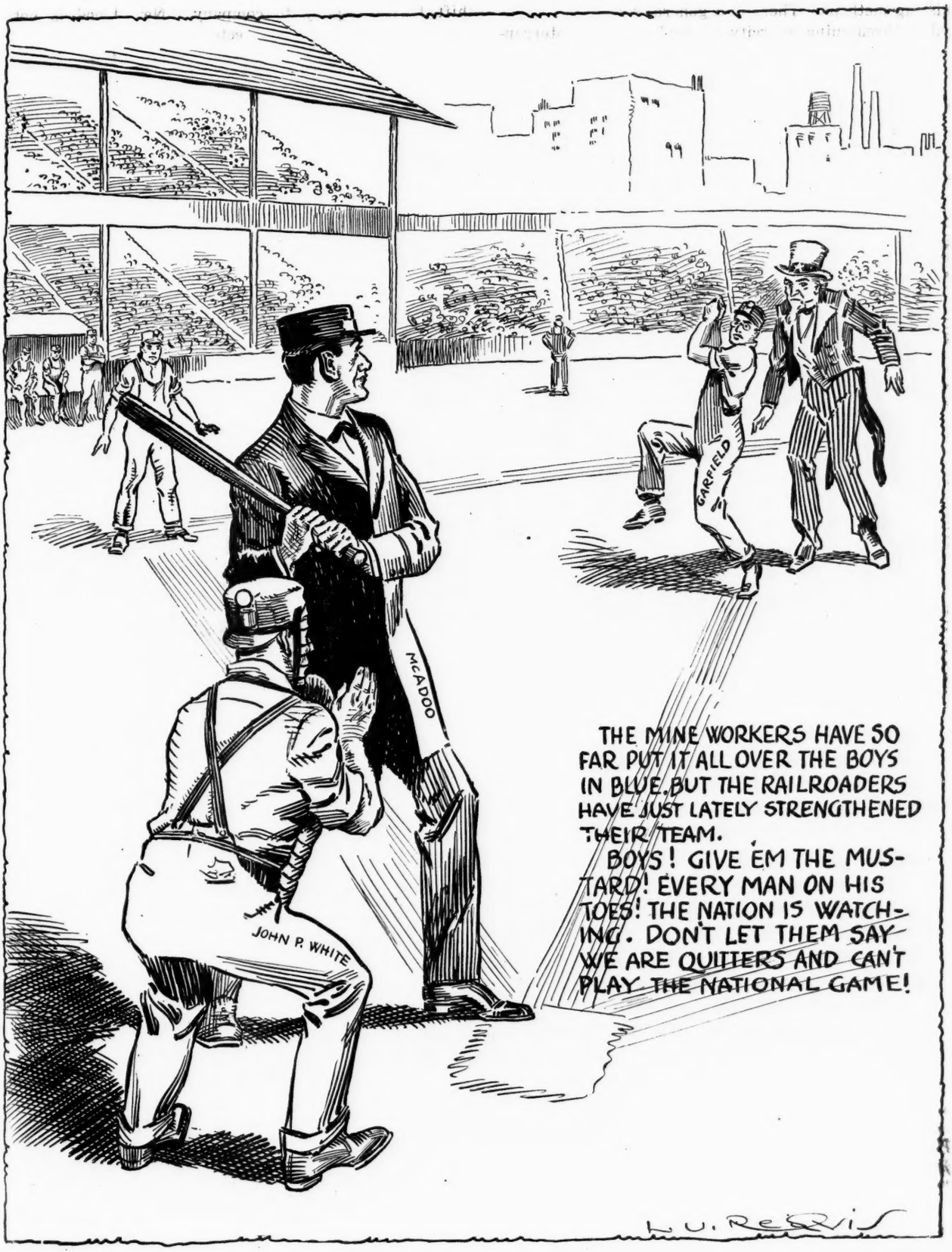
An outstanding quality of a stranger may dazzle a chief executive, so that he will overlook the possibility that many unknown frailties of judgment will detract from the value of the stranger's services. Similar frailties in a subordinate being well known to his employer will condemn that man to his chief and result in his being replaced by a man whose success in securing a job is based as much on what is not known about him as on the qualities he is known to possess.

But with it all there is an advantage in leaving unobstructed the freedom of choice. The rejected always have hope. Some one in control may ultimately be won by certain of the employee's better characteristics and be not too well informed as to the others. Or again, another man may place the qualifications of his subordinates in a different order, and another job may be better tackled by a man of the subordinate's particular qualifications. So there is always hope, and where the hope depends on merit and personal endeavor a struggle for success always seems worth while.

Too much turnover is as bad as not enough. The soil needs stirring every so often that new elements may be brought to help fructify the field. Moreover, elements from outside need to be brought in. If Great Britain were as ready to cashier her business men as she is her statesmen, she might find it would not have altogether a bad effect on the conduct of her business.

If she did not hold in peace times such a beneficent opposition to discharge, the output per man might be increased and the welfare of her populace consequently augmented. The British workman is a competent artisan, but knowing his job is assured him he is a little too much inclined to "lay back in the shafts." The British executive is a well-posted official, but as his "berth" is secure he is a little disposed to "vegetate" and let himself drift in a sea of tradition.

Don't Let Them Take the Pennant


McADOO
JOHN P. WHITE
GARFIELD
THE MINE WORKERS HAVE SO FAR PUT IT ALL OVER THE BOYS IN BLUE. BUT THE RAILROADERS HAVE JUST LATELY STRENGTHENED THEIR TEAM.
BOYS! GIVE 'EM THE MUSTARD! EVERY MAN ON HIS TOES! THE NATION IS WATCHING. DON'T LET THEM SAY WE ARE QUITTERS AND CAN'T PLAY THE NATIONAL GAME!
W. U. REVIS

DISCUSSION BY READERS

Mining Equipment

Letter No. 6—Recently, one or two writers, in *Coal Age*, discussing the need of employing the most improved and up-to-date mining equipment, drew attention to the disinclination of coal operators to advertise improvements in their methods and devices used, or to explain the benefits derived from the installation of new types of machinery. It was urged, then, that the coal industry would be greatly benefited by a broader spirit of coöperation that would enable others to profit by our experiences.

Much as I dislike, at this time, to use this reference, it is an established fact that a great deal of the efficiency of German manufacturing methods was acquired because they had a large number of their brainiest men, whose sole duty it was to visit in foreign countries, going to as many of our up-to-date manufacturing plants as possible, where they had an opportunity to observe the latest and best practices employed.

It has been stated that when the war was first started, in 1914, there were nearly fifty of the leading mechanical men and engineers of Germany traveling incognito in the United States, and inspecting our manufacturing plants, raw-material supplies and methods of developing new articles. That they accomplished much for the German Empire goes without saying. It is further proved by the results of high-grade intercourse among the members of the industries having to do with the production of motor vehicles, farm tractors, agricultural machinery and a number of other lines.

BROAD-MINDED OFFICIALS NEEDED

It is a fact, indeed, though I much regret to say it, that there has been a woeful lack of thorough coöperation and understanding between many of the coal-mining fraternity. This might be classed under the head of business policy or professional jealousy; or it may come from a lack of comprehension as to the advantages to be gained by the right kind of intercourse.

There are a number of companies, however, that are blessed with officials having a broader vision. When such are contemplating making new openings or enlarging their present plant they always make an extended trip through the various coal fields. I have a number of good men in mind who have covered the Illinois, Indiana, Kentucky, Ohio, Virginia, West Virginia and Pennsylvania coal regions, before making a move toward the new work.

A study of the recommendations of these men is convincing proof of the value of their action. It is to be regretted that so many of the higher officials of coal companies are not disposed to allow their operating officials sufficient expense money to permit of their visiting a few of the most up-to-date operations and observing the latest type of equipment in use.

The columns of *Coal Age* perform a powerful function, but the effect can be multiplied many times if proper heed is given to the suggestions and intelligent visiting is done by responsible operating officials.

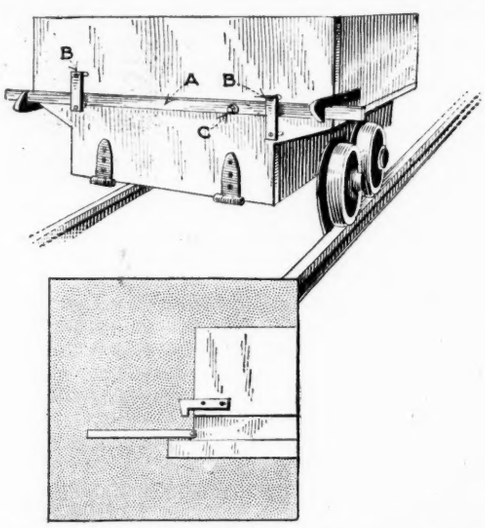
Financial questions are often discussed by the moneyed powers, but with the exception of a few institute meetings, in the different states, and the meetings of the Coal Mining Institute of America, and the American Institute of Mining Engineers, no liberal interchange of ideas is offered to operating officials, who may be called the mechanical producers. They are the men who are definitely responsible for coal production.

I wish to advance the thought that a great deal of good can be accomplished by closer coöperation on the part of worth-while operating officials, and by a greater number of talks, face to face.

Philadelphia, Penn. PATRIOT.

Mine-Car Door

Letter No. 5—In response to the inquiry of V. C. Robbins, *Coal Age*, June 1, p. 1031, kindly allow me to submit the accompanying sketch of an arrangement I would suggest for hanging the end-gate of a mine car that will meet Mr. Robbins' requirements. He states



END-GATE HELD BY PIVOTED BAR AND LATCHES

that the gate must be hung so that coal can be loaded through the end of the car, instead of lifting it over the sides, as the seam is low. Also the gate must be so arranged that the car can be dumped automatically when hoisted on a self-dumping cage.

Referring to the figure, *A* is a dogbar made of heavy bar iron. The length of this bar must be such that its ends will extend from three to four inches beyond the sides of the car. As shown in the figure the bar passes under two heavy iron straps or brackets *B B*, which are long enough to allow the bar to play freely up and down

as required. The bar is pivoted on a heavy bolt *C*, which passes through the end-gate.

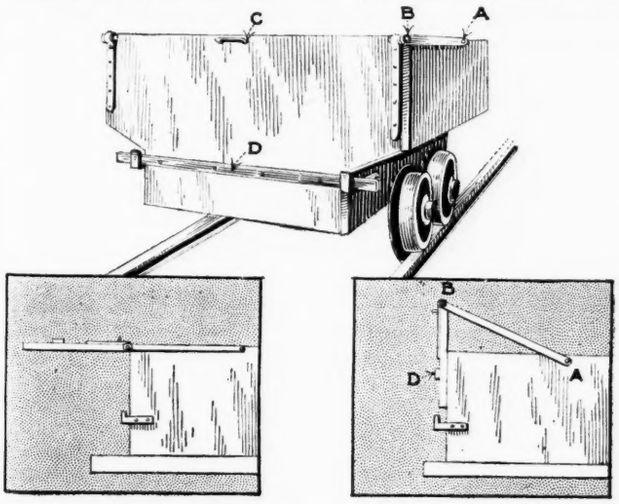
Bolted to the sides of the car are two "dogs" made of strap iron, each having a hook at the end to form latch fastenings for the bar. One of these latches is arranged for a downthrow and the other for an upthrow of the bar. The purpose of pivoting the "dogbar" on one side of the center is so that the downthrow end will be heavier than the upthrow end, which will cause the bar to fall readily into the latches.

The operation of this device is simple. As the car ascends on the cage, the downthrow end of the bar comes in contact with a projecting arm in the shaft and the gate is released, allowing the coal to fall from the car into the chute. Should the car, however, be on the opposite cage, the projecting arm on that side of the shaft must be hinged so that the rising car will pass it readily, but it will trip the dogbar as the cage is lowered for dumping into the chute. Each of these arms must be so arranged that they can be withdrawn if necessary, by moving a lever when the cage is ready to descend the shaft. For this purpose, a simple crank trip will be found most convenient. GEORGE W. RAMSEY.

Molus, Ky.

Letter No. 6—The inclosed rough sketch is submitted, in answer to the inquiry regarding the best arrangement for supporting the end-gate of a mine car, so that the car can be loaded through the end, in a low seam of coal, and still allow the gate to be operated automatically when hoisted on a self-dumping cage.

My plan is to support the end-gate on two long arms that are hinged about the center of the top of the car on each side, as indicated at *A*, in the accompanying



END-GATE HELD BY FIXED BAR AND LATCHES

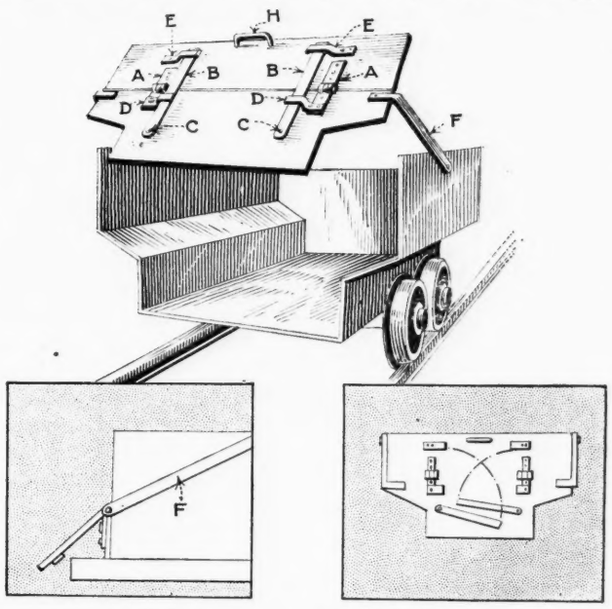
figure. This is the common form of supporting the end-gate of cars used on self-dumping cages. However, my suggestion, now, is to hinge the top of the door to the two ends of these bars at *B*. These hinges must be so arranged as not to permit the door to swing outward far enough to interfere with the grip of the door-lifter, at the top of the shaft, when it engages the hook fastened to the end-gate at *C*. In addition to these hinges, a straight iron bar *D* is bolted firmly to the end-gate, and extends beyond each side so as to drop into the side latches bolted to the body of the car.

No explanation is needed to show the operation, which is very simple. As the car is hoisted to the top of the shaft and the cage allowed to settle back, the hook *C* attached to the end-gate of the car is caught by the door-lifter hanging in the shaft. As the cage sinks to the line of the chute, the door is pulled upward and the coal slides into the chute. J. A. BIER.

Indiana, Penn.

Letter No. 7—I beg to submit the following suggestion in regard to arranging the end-gate of a mine car, so as to permit the coal to be loaded through the end of the car, in a low seam, and provide for the automatic dumping of the car when it is hoisted on a self-dumping cage.

As shown in the accompanying figure, the end-gate is made in two parts, hinged together by two stout hinges



DOUBLE END-GATE SUPPORTED BY SWING BARS

A A. When the car has been loaded these hinges are prevented from bending by two heavy swing bars *B B*, which are pivoted to the lower portion of the end-gate, at *C C*, and further strengthened by passing under two lugs *D D*. When swung into an upright position the bars are held firmly by two spring latches *E E*.

This arrangement will permit the dropping of the upper portion of the end-gate when the car is to be loaded in the mine. When the loading is nearly completed this portion of the end-gate is raised and the two bars swung into position and fastened by the spring latches *E E*, which can be made of any convenient form desired. The two parts of the end-gate now form one rigid whole.

As shown in the side elevation, the end-gate, as a whole, is supported by two long hinges of bar iron *F*, which are pivoted to the sides of the car near the top, about the center of the car. Attached to the top of the end gate is a strong hook *H*, which is engaged by the door-lifter at the top of the shaft when the car is about to be dumped into the chute. I believe no further explanation is needed to make the operation clear.

MATTHEW STAFFORD.

Chase River P. O., B. C., Canada.

Coal Conveyors at the Face

Letter No. 1—Sometime ago an interesting article by Sydney F. Walker appeared in *Coal Age* (Vol. 10, pp. 744, 790), describing the benefits derived from the use of coal conveyors, at the working face. I believe this may be a fit subject for discussion, since there is at present a shortage of labor in all districts as well as an increase in wages, both of which conditions may be greatly helped by the use of face conveyors where they can be installed.

Experience teaches that the conveyor saves, in underground operation, in two ways. It increases the tonnage of coal that can be handled by one man, and decreases the cost of handling per ton. This is certainly something worth accomplishing. The result is apparently due to a couple of causes. The increase of tonnage handled by one man comes from decreasing the amount of time wasted. Formerly a man and his helper had to shovel coal along the face to the roadhead, fill the box, and tram it to the gathering place or the end of his road, and return with another box to repeat the process of loading. This was a great waste of time as compared with the conveyor system.

In the use of the conveyor, the means of taking away the coal is right at the man's back. He does not need to move from his place to load his coal, and the effort required is much less than when loading a box, owing to the small distance through which the coal must be raised. Another small advantage is that the percentage of round coal is generally greater in the conveyor, as the coal is turned over but once. This may be offset, however, in certain instances by the breakage occasioned at the roadhead where the coal is loaded into the cars.

How the Face Conveyor Reduces Cost

The saving in cost of handling appears to be attained through the reduction in labor; but I think this only applies to those coals that are, say under four feet in thickness, or to coals that require to have stone taken down for height in the roadheads. If we suppose a section to contain eight or ten roads, there must be a large sum expended in ripping down this rock to give the required headroom. Perhaps a foot or more of rock must be dropped and then built into packwalls, or disposed of in another way. The conveyor reduces this cost very considerably; but the extent to which that can be done is entirely dependent upon the seam, which brings us to consider the method of working.

Conveyors as we know them today are only adapted to long straight longwall faces. The type of combined conveyor and loader, designed to follow the coal-cutting machine from room to room, has not reached a practical stage of development, as yet. But the conveyor now in use makes it possible to work certain coals, under the machine-longwall system, successfully, that were failures under the hand-longwall system. The main reason for this is the speed of operation; or, in other words, the rapid advance of the face, which overcomes roof troubles that were apparently insurmountable obstacles in handwork.

The conveyor appears most likely to score its greatest success where the coal is relatively low and contains a band of stone that will provide good packs behind the face. Another type of coal that would probably produce equally good results is one where the roof breaks a little distance behind the face and completely fills the wastes, which can be assisted by a proper placing of the timbers. Under these two conditions the possible saving in operating expenses may be very great. Coals that are thicker and have roofs that won't stand the required span, but break short off, causing face falls of stone, lessen the saving, until the point is reached where it is necessary to employ another system.

I do not remember whether Mr. Walker explained that conveyors are not necessary adjuncts to coal cutters in longwall work; although they were, perhaps, first devised as a means of more quickly taking away machine-cut coal. Conveyors have been used successfully in mines where the coal is cut by hand. The use of a coal cutter and conveyor on the same face requires a good stretch of open roof, between the coal and the waste side. This cannot always be accomplished without too great a cost.

Where there is but room for one machine, either a cutter or a conveyor, the cutter will save on the cost of mining, which is generally considered the hardest part of a miner's work, while the conveyor saves on the loading. The ideal conditions are where both machines can be worked together.

Questions Affecting Installation of Conveyors

In conveyor practice, there are two points that require to be considered aside from the machine itself; namely, the manner of paying for the coal, and the attitude of labor toward the introduction of the machine. It is, of course, impossible to know how much coal each miner shovels into a conveyor; and the plan that has given the best satisfaction is to contract a conveyor face to one man. The plan of dividing the coal loaded from one face between the men loading on that face commonly gives rise to the usual squabbles and disputes.

The attitude of the miners is always a factor that cannot be ignored. Prejudice and lack of acquaintance with the system may be so strong that despite obvious advantages the introduction of a conveyor may be for the worse. It is best to introduce the subject slowly, talking it over at every opportunity with the men. Some miners will listen attentively to any new proposal and help it along, but there are others who regard such a move with suspicion.

In closing, let me say that the great field for conveyors is the thinner seams of coal, having a roof that will permit maintaining a considerable length of longwall face, in a straight line. There will generally be a greater output of coal for the same number of miners employed owing to the more rapid advance of the working face. This will require a greater number of mine cars and other equipment in proportion. It is important to remember, also, that a much larger quantity of coal will have to be handled on a single road, starting from the end of the conveyor where the coal is dumped into the cars. Unless ample provision is made to prevent congestion of loaded and empty cars on this road, the advantage to be derived from the installation of the conveyor will be lost through unavoidable delays.

Sydney, N. S. Mining Engineer.

Sealing Off Fire On Intake

Letter No. 3—From my experience with mine fires, I would say no two of them are ever alike. The character of the fire will depend on the material and amount of air with which it is fed. Sometimes these sources of feeding are very ample and there is produced such a violent sweep of flame in the entries that approach to the seat of the fire is most difficult and dangerous. At other times the presence of gas is the chief danger to be encountered.

In order to hermetically seal off a fire that has gotten sufficient headway to demand such a proceeding, I would attempt to build a 9-in. brick wall in each heading, outside from the fire and as close to it as practicable. I would build both stoppings at the same time and carry them to a height of 4 or 5 ft. At that point, I would cease work on the return stopping until the one on the intake has been completed, after which work on the return stopping should be rushed to completion.

In order to safeguard the men performing the work, I would make an opening in a stopping, a short distance back, sufficient to permit men to pass to and fro, as occasion might demand. This would also allow of the regulation of the air current, reducing the quantity of air passing over the fire but allowing sufficient air to reach the men performing the work of building the stoppings.

It is impossible to give an intelligent answer to the questions asked in regard to the condition of the air behind the stoppings when the stopping in the intake is closed first, or when closing the return first. The condition of the air behind these stoppings, in any case, will depend on too many variable elements, making an answer to these questions mere conjecture.

Allow me to suggest that greater safety might result from building the stoppings in a manner that will permit of their final closing simultaneously, by means of an iron door backed with asbestos. R. W. LIGHTBURN.

Perryopolis, Penn.

Letter No. 4—The question asked in *Coal Age*, June 22, p. 1173, is well worthy of discussion, especially in regard to the order of building the stoppings required to isolate a fire that has gained much headway.

On the first question, let me say that if I was in charge of a mine in which a fire occurred under the conditions mentioned in this inquiry, I would get together the necessary materials as quickly as possible and start and build my first stopping on the return entry, having previously opened a stopping outby from the fire, in order to short-circuit a portion of the air and not permit the entire current to reach the fire.

Having completed the stopping on the return airway, I would wait a short time, to allow the space behind this stopping to fill with the smoke and gases generated by the fire. I would then build the second stopping on the intake airway, as near to the seat of the fire as practicable. When building this stopping, I would carry a brattice along one rib of the entry, to conduct the air current forward to where the men are to work and allow it to return to the crosscut previously opened. This will give the men good air while performing the work. When this stopping has been built and closed, it will not be long before the extinctive gases produced will smother the fire.

Referring to the second question, permit me to say that should the intake stopping be built and closed first, the pure air lying between this stopping and the fire would shortly become charged with the gas generated in the heading and with carbon monoxide, which will be produced by the fire owing to the limited air supply, and an explosion is very apt to follow.

On the other hand, referring to the third question, it is clear that if the return stopping is built and closed first, the fresh air reaching the fire from the intake will probably prevent the formation of an explosive mixture. Carbon dioxide will be produced by the fire, in this case, instead of carbon monoxide, and the space inside of the fire and behind the return stopping will soon be filled with extinctive gases, which should prevent an explosion taking place. THOMAS JONES.

Chickasaw, Penn.

Interpreting Mining Laws

Letter No. 7—Kindly allow me to refer to the question raised by Charles Martin, *Coal Age*, June 8, p. 1080, regarding what he assumes is vague in respect to ventilation, in the bituminous law of Pennsylvania. It seems to me that the meaning of the law is sufficiently explicit and clear regarding the ventilation of the working places in mines.

As has been pointed out in the reply to this inquiry, the law requires that each working place shall be ventilated in such a manner that it will be safe and healthy for work, which seems to be the determining factor. It would be impossible to comply with this provision of the law if men were compelled to work in an air current that had passed through a gob section in the mine before reaching the men, in the manner mentioned by Mr. Martin.

In regard to the distance apart for driving breakthroughs or crosscuts, the mining law in West Virginia provides that this shall not exceed 80 ft. unless brattice is used to conduct the air forward to the face of the entries. The law further provides that not more than sixty men shall be permitted to work on the same air current, except as permitted by the mine inspector under conditions that, in his judgment, make it impracticable to comply with this requirement of the law.

NO ECONOMY IN DRIVING FAR AHEAD OF THE AIR

Strictly speaking, it is neither economical nor advisable to drive entries more than 80 ft. ahead of the air, except for exploratory purposes, where brattice must be used to conduct the air forward. Unless the price for yardage is excessive, or conditions demand the driving of the entry a greater distance ahead of the air, it will generally be found more economical to drive the crosscuts within the limit specified in the law.

Referring to the question of what is to be understood by "return airway," let me say that I have always considered the return to start from the point where the air current passes through the last crosscut, on a pair of headings or in a particular section of the mine. Some complication may arise when a pair of crossentries have butt headings driven off them. The air from the return butt heading may then, in many

cases, pass into the intake crossentry and continue till it reaches the last crosscut on that entry, where it passes into the return entry. This is the case where the crossentries and the butts are both ventilated by a single current, which is often done in a nongaseous mine. In that case, the total number of men working on the crossentries and the butts must not exceed that specified in the law for a single air split.

In a nongaseous mine, however, the return from the butts should be conducted, by an overcast, directly into the return crossentry. This will provide a separate air split for ventilating the butts and the crossentries, respectively. In no case, however, should an air current that passes through a gob section be permitted to ventilate another live section, as mentioned.

Thomas, W. Va. W. H. NOONE.

The Mining Situation

Letter No. 4—Though I read with much interest Thomas Hogarth's letter, *Coal Age*, June 29, p. 1208, I cannot agree with him on all that he has said with regard to the present situation in coal mining. It must be admitted that the present mine-labor question is a serious one, and that something must be done and done quickly to prevent the scarcity of labor creating great loss in the anthracite field.

Much has been said recently in regard to miners not working full time, and some operators have asked their men to work more than eight hours a day. I want to say that if operators will give a miner all the cars he can load in eight hours, six days in the week, there will be no shortage of coal in the anthracite field the coming winter.

In my opinion, there are enough miners in this field to produce more anthracite than the nation can use. It is my belief that it is not the fault of the men nor the length of the working day, but miners are prevented from demonstrating their full ability to produce coal, because they are unable to get cars when they want them. At least, that has been my observation in this district. When a good miner receives but three cars a day and can produce coal that would fill seven cars he cannot be blamed for working short time and going home when he has loaded the cars given him.

SUGGESTS GIVING DRAFTED MEN SHORTER NOTICE

Where this condition exists, which is by no means exceptional, there is an evident loss of 50 per cent. in the capacity of the mine. Let me repeat what I have stated before, the remedy is not to be found in increasing the number of working hours per day, or in finding more miners for the work. There is, however, I admit, a shortage of drivers, runners and company men; but this can be offset, in many cases, by the adoption of improved mechanical equipment that will take the place of much man power.

It is true that time is lost by young men who are subject to draft quitting the mines, four, five, and six weeks before the time when they expect to leave for camp. The only remedy for this condition would be for the Government to revise their regulations in regard to notifying the men of the time they will be called. A shorter notice, say of a few days only, would cause little inconvenience and would hold the men in the mines to within a short time of their departure for camp.

Regarding the "National-Service Button" that a certain writer suggested should be given to men of draft age to indicate that they are engaged in work essential to the winning of the war, this appeals to me as being practical and necessary, particularly in coal mining. Like everything else, however, the scheme has its disadvantages. Unless properly safeguarded, it would do more harm than good, since there is a class of nonproducers who would drift into the mines, simply to avail themselves of the opportunity thus offered to escape the draft.

On the other hand, there are a large number of young men, who are efficient mine workers and who have no fear of the draft, but rather favor being given the opportunity to go across. I have heard many of this class say that "it is worth dying to see the other side, visit new places, and come in contact with new men." There would be no advantage, but great disadvantage, in replacing this class of good men with men who have no knowledge of mining and applying for work only to escape the draft. Coal is an absolute necessity and the output will fall short of the demand unless good miners can be held at their work in the mines. Let me say to every miner, You will show more patriotism by remaining steadily at your present work than by seeking to join the fighting forces "over there."

LURED BY OFFER OF HIGHER PAY IN OTHER INDUSTRIES

There is another feature affecting the coal situation, however, and it has the effect of drawing many good men away from the mines, when they find that they can make a dollar a day more at other work than mining coal. But, such men show that they love themselves more than they do their country, since they place their own interests before the Nation's needs. Patriotism demands that each man must work where he can do the most good.

In my opinion, the Government should take steps to prevent an employment agent from going into a mining camp or district and offering these inducements to miners working in the mines. It is true, as Mr Hogarth states, that the miner is receiving good wages today; but the price of living has advanced 100 per cent. and some necessities have been advanced 200 per cent. since the war began. Taking these things into consideration, the miner is earning less today than he was two years ago.

It is my belief, also, that Mr. Hogarth has overestimated the number of automobiles owned and run by miners. Such is not the case in the Wyoming valley, where it would be hard to find ten autos that are owned by the many thousands of mine workers in this region. I must also take exception to his statement that 90 per cent. of our miners being foreign-born "many of them cannot read and all they know is what they hear." Let me say that some of the smartest miners in the anthracite region are foreign-born, and, I believe, 95 per cent. of our men working underground can read and write. That is my conviction after working with them for 25 years, in the mines in this region.

Kingston, Penn. FRED B. HICKS.

INQUIRIES OF GENERAL INTEREST

Diffusion of Gases

Kindly explain what takes place in the diffusion of gases and what is its cause. The law of diffusion states that the rate of diffusion varies inversely as the square root of the density of the gas; but that does not explain the cause or the action of the gas in diffusing. It is this action that I am mostly interested in at the present time and hope to have explained. STUDENT.

La Salle, Ill.

The molecules of all matter are assumed to be in a state of constant vibration. The amplitude of the vibration, or the length of the path through which the molecules vibrate, varies with the density of the gas, being longer for a gas of less density and shorter for a gas of greater density. For this reason, when two bodies of gases of different densities are in contact with each other the vibration of their molecules at the plane of contact is not supported; or, in other words, there is a lack of equilibrium in the vibratory motion of the molecules at the point where the gases are in contact with each other. The direct result of this lack of equilibrium is a gradual progression of the molecules of each gas into or among those of the other gas, thus causing the two bodies of gas to intermingle.

Now, it is evident that, since the molecules of the lighter gas vibrate through a greater distance than those of the heavier gas, a larger volume of the lighter gas will pass over into the heavier one, and a relatively lesser volume of the heavier gas will pass over into the lighter one. The ratio of these interchanging volumes will be greater as the difference between the densities of the two gases is greater. For example, the specific gravity of marsh gas (CH_4) referred to air being 0.559, its rate of diffusion $\frac{1}{\sqrt{0.559}} = 1.3375$. In like manner the specific gravity of carbon dioxide (CO_2) referred to air being 1.529, its rate of diffusion is $\frac{1}{\sqrt{1.529}} = 0.8087$. The specific gravity of carbon monoxide is 0.967 and its rate of diffusion is, therefore, $\frac{1}{\sqrt{0.967}} = 1.0169$.

From these examples of the rates of diffusion of different gases it should be evident that the greater the difference between the densities of two gases the greater, likewise, will be the difference between the volumes passing over in each case; and again, this greater difference in the interchanging volumes of the two gases creates more quickly a uniform density of the mixture, and produces a quicker saturation and equilibrium of the molecules, because the heavier gas is made lighter and the lighter gas heavier more rapidly than when the interchanging volumes of the gases are more nearly equal.

Diffusion ceases when saturation takes place, and this occurs only when the mixture has attained a uniform density throughout. The aggregate of the molecular vibrations in the mixed gases is such that there is a complete balance of the reacting forces, and there is no longer any tendency to progression of the molecules.

Squibs vs. Electric Fuse

For many years I have been using the ordinary miners' squib for blasting coal. There is a squib known as the "Red Spitter." I would like to learn the opinion of *Coal Age* readers in regard to the question of which is the safest to use, the squib or the electric fuse, when blasting coal with black powder or when using permissible powders. Kindly explain what is meant by the electric fuse and how its use is safer than that of the squib. MINER.

Johnstown, Penn.

We shall be glad to have readers of *Coal Age* give their opinions in regard to the relative safety of single- and double-tape fuse, squibs, electric fuse and electric detonators, for blasting coal, explaining the adaptation and use of each of these means for exploding a charge. In former years shots were quite generally fired with ordinary fuse, and black powder was almost universally used in blasting coal.

Accidents were frequent in the performance of this work, owing to various causes, such as inferior quality of fuse, lack of care in tamping the hole, or inefficient tamping. While time has brought many improvements both in the methods and the devices employed in blasting, the prejudice of miners long accustomed to the use of fuse and squibs has been the chief obstacle in the introduction of electric firing and the use of permissible explosives.

The frank discussion of these methods and appliances, by practical miners, will go far toward emphasizing the danger to be avoided by the use of the more improved means for blasting coal. We will leave this question, therefore, for those who have learned by practical experience where the greatest safety lies in blasting operation. We will suggest, only, that contributors shall not confuse electric fuses with electric detonators, these two types of exploders being radically different in construction and operation.

Electric fuses resemble, in outward appearance at least, electric detonators. Each of these exploders have a cap containing a composition that is readily fired by an electric spark that passes between the wire terminals when the current is generated in the circuit. In the fuse, however, the cap is of heavy paper and contains chemicals that burn as a match; while the detonating cap is of copper and contains a fulminate that is highly explosive, and its detonation causes the explosion of the cartridge or charge.

EXAMINATION QUESTIONS

Mine Foremen's Examination, Carbondale, Penn., Apr. 23, 1918

(*Selected Questions*)

Ques.—What is meant by the terms "rubbing surface" and "friction," as used in mine ventilation?

Ans.—The term "rubbing surface," as the words imply, denotes the entire surface of the mine or airway, in contact with the air current. This includes the total surface of the top, bottom and sides of the airway.

"Friction" is the resistance developed by the movement of one body upon another with which it is in contact. In mine ventilation, the term refers to the resistance that the rubbing surface of a mine or airway offers to the passage of an air current.

Ques.—What is the minimum quantity of air required by law, for each person employed in the mine?

Ans.—The Anthracite Mine Law of Pennsylvania (Art. 10, Sec. 3) requires a minimum of 200 cu.ft. of air per minute, for each person employed in the mine.

Ques.—What advantage is obtained, in a mine, by having separate splits or districts?

Ans.—Dividing the mine into separate ventilation districts, each having its own air split, enables a better control of the ventilation. The quantity of air passing in each split can then be proportioned to the needs in the several districts. A larger volume of air can be circulated by the same power, and the velocity of the air current at the working face, in each district, is normal. At the same time, fresh air is supplied to each district, and the smoke and gases generated in one section of the mine do not pass through another section, but are conducted at once into the main return airway and pass out of the mine. Should an explosion of gas occur in one district, it is not apt to affect another district.

Ques.—What is the maximum quantity of gunpowder or any other explosive that a coal miner can have at any one time in his working place?

Ans.—Rule 26 (Art. 12) of the Anthracite Mine Law forbids a miner to keep more than 25 lb. of any explosive, unless more is required for his day's work.

Ques.—What is the purpose of safety holes and where should they be made?

Ans.—Rule 43 of the anthracite law requires that safety holes not more than 150 ft. apart and of proper dimensions shall be provided on all haulage roads used as travelingways, when the width of the road is not sufficient to permit persons to pass the cars with safety. These holes must be made on one side of the road only and kept free of all obstructions. Rule 49 requires safety holes to be made at the bottom of all slopes and shafts, in order to enable footmen to seek refuge in case of danger. Safety holes should also be provided wherever a door requires an attendant.

Ques.—How does the power producing ventilation vary as to the quantity produced?

Ans.—The power on the air, in mine ventilation, varies as the cube of the quantity of air circulated. Thus, to double the quantity of air passing in the same airway, will require $2^3 = 8$ times the original power on the air. This does not take into account, however, the change in the efficiency of the ventilator, which may require somewhat more than eight times the power applied to the fan shaft, in order to double the quantity of air passing in the mine.

Ques.—What would you suggest to reduce accidents with mine cars?

Ans.—Strict rules and regulations should be made and enforced regarding the movement of all cars and loaded and empty trips. No cars must be left standing in the mouths of rooms or on side tracks without being properly blocked to prevent their running out onto the main road. A suitable danger signal should be carried on the rear of every loaded and empty trip. Where two drivers are working on the same haul, they should follow each other and not alternate the trips. A reliable signal system should be maintained in use.

Competent trackmen should be employed to keep all roads in good condition, and every requirement of the mining law in respect to proper clearance at the side of haulage roads, refuge holes and other safety appliances should be strictly fulfilled. All cars and trips must be well spragged when descending a grade and a door should never be located at the foot of a grade. Close supervision must be maintained to see that the roads are kept clean and free from any obstruction. All rolling stock must be regularly and carefully inspected. The style of car used should be such that men are not liable to be caught when coupling them. There should be a safe limit to the speed of haulage and such other rules must be adopted as appear to be necessary to reduce the chance of accidents.

Ques.—How would you detect marsh gas (CH_4), blackdamp (CO_2) and whitedamp (CO)?

Ans.—The presence of marsh gas (CH_4), in the mine air, is detected by observing the formation of a cap on the flame of a safety lamp and the action of the flame, which is elongated and increased in size, depending on the proportion of gas present in the air.

Carbon dioxide (CO_2) is detected by the dimness and possible extinction of the lamp flame; also by the effect produced on the human system by this gas, which causes headache, nausea, pains in the back and limbs, when breathed for any length of time. Blackdamp is any varied mixture of carbon dioxide and nitrogen, caused by the depletion of the oxygen of the air, from any cause.

Carbon monoxide or whitedamp (CO) when present in the air is detected by observing its effect on small caged animals such as mice and birds. These little animals are quickly prostrated by the gas, the effect being much more rapid than is produced on the human system. The gas is extremely poisonous, the smallest percentages often proving fatal when breathed.

COAL AND COKE NEWS

Uniontown, Penn.

Trustees in bankruptcy of Josiah V. Thompson, former coal baron, have optioned 5000 acres of "back" coal in Whitely and Franklin townships, Greene County, for an average price of $350 per acre. Steps will shortly be taken looking toward the ultimate consummation by the courts of the gigantic deal. While it was announced that the options were given to Chicago interests, their identity was withheld.

The present deal was made immediately after the completion of the so-called Frick deal, whereby 1100 acres of Greene County coal was sold to the H. C. Frick Coke Co. for $3,700,000. It ranks second in importance to that deal, the total in the present sale approximating $2,000,000. While the consideration is almost $200 per acre less than that secured for the river-front coal, the price is considered equitable by the trustees because of its location. The Franklin and Whitely tracts are far removed from railroads and will be accessible only with difficulty.

For convenience in putting the sale through the court, many tracts were merged into one block to form the 5000-acre tract. Scores of coal landholders are associated with the trustees in bankruptcy in the $2,000,000 deal, and its consummation will dispose of the largest single block of Greene County coal ever transferred in one sale.

Manufacture of coke breeze has been placed under control by the local fuel administration in an interpretation of the new fixed coke-price order issued from Washington. In that order the price of breeze is fixed at one-half the established coke price, whereas in the past breeze from the local field commanded the price for prepared coke. Administrator Byers has ruled that coke breeze screened from the ash dump shall be classed as screen coke where it is free of impurities, but where careless loading is noted the product will be classed merely as breeze. That order creates a premium of $2 for clean breeze and a similar penalty for dirty loading. A rigid inspection will be made of cars loaded with breeze, Mr. Byers announced, to enforce the provisions of the order.

Charleston, W. Va.

The New River District has had no difficulty in securing an adequate supply of cars, and the power furnished has been entirely sufficient for the mines in the district since a vigorous protest was made to Washington. The car supply for the Fairmont district was most auspicious for the first part of last week, there being no less than 2116 cars in the district on Monday, 54 of which were coke cars. This supply was largely in excess of any received for some time, at least for the beginning of the week. The Monongahela road was able also to furnish the mines in Monongalia County a 100 per cent. supply, something extremely rare in that section. With 1792 cars in the Fairmont region Tuesday, a banner day in the district, not a mine was shut down.

Following a recent meeting of the members of the Winding Gulf Association, operators belonging to that association are taking steps to put into effect the suggestion that increased personal supervision would be conducive to increased efficiency in the mines. The great drawback in the Winding Gulf territory seems to be the bad condition of railroad tracks there. The car supply is ample so far as distribution is concerned, but delivery of loads and empties is interfered with because of frequent wrecks attributable to lack of proper maintenance.

Some idea of how production was affected in the Kanawha district by the Fourth of July lay-off may be obtained from the production figures for the district for the week ending July 6, only 147,729 tons being produced as against 195,000 for the previous week. A further idea of the exodus over the Fourth and its effect on the coal industry is shown in the fact that the loss of hours due to labor shortage was 1061 and the loss due to the holiday lay-off was 1200. The car supply was excellent last week and the week previous. Loads shipped out during the first week in July were 14,078 and empties received 12,300. It is understood here that coal operators and lumber operators found it necessary to go to Catlettsburg, Ky., the nearest "wet" point to this part of the state, to bring back their miners.

Fairmont, W. Va.

Operators from twelve and one-half counties in the northern part of West Virginia, belonging to four existing coal associations, met at Fairmont last Friday and in one of the largest assemblages of coal men ever held in Fairmont sanctioned the organization of what is to be called the Northern West Virginia Coal Operators Association, the purpose of such organization being to bring the coal men of the sections covered into a more compact organization, and in order to encourage concert of action in all matters touching the coal industry.

In accordance with the sense of the meeting, C. H. Jenkins, C. H. Tarleton, E. Drennen, D. Howard and S. D. Brady were selected as a committee on organization and were vested with authority to prepare a petition for a charter for the new association. The following districts in the Fairmont region were represented and for each of them a temporary Board of Directors was named, designated as follows:

Fairmont Subdistrict—A. B. Fleming, Jr., A. C. Beeson, J. A. Clark, Jr., G. E. Petticord, C. H. Jenkins. Clarksburg Subdistrict—A Lisle White, D. Howard, J. M. Hoar, C. J. Ryan, V. E. Goecke. Elkins Subdistrict—E. D. Baker, A. G. Wodell, W. J. Williams, A. R. Miller, R. B. Isener. Morgantown Subdistrict—S. D. Brady, C. W. Chapman. Kingwood and Grafton Subdistricts—Two directors to be named. The three directors at large selected were: J. M. Wolf, of Fairmont; J. A. Jenkins, of Clarksburg, and E. Drennen, of Elkins.

A feature of the meeting was the presence of J. D. A. Morrow, one of Dr. Garfield's lieutenants, A. W. Calloway, Director of Bituminous Distribution, and J. B. Neale, Director of Production.

In addition to the foregoing a number of well known railroad and coal men were present, among such being T. L. Lewis, Secretary of the New River Association.

Terre Haute, Ind.

Production of coal by Indiana mines reached a record figure for June, 2,546,452 tons being hoisted as compared to 2,403,263 for May. The June record was made in spite of a shorter month of one day, a pronounced car shortage and some labor difficulty. The car shortage for the month was 11.32 per cent. as against 12.32 per cent. in May. The additional tonnage possible with a full car supply was 416,735. That is to say, had the railroads furnished a full quota of cars, Indiana mines would have produced almost 3,000,000 tons, or at the rate of 36,000,000 tons a year. Supplies in the future, however, are not only dependent upon the rate of production, but also on the extent to which railroad coal is shipped out of the state. So far this year there have been considerable shipments of railroad fuel and screenings to Columbus, Dayton and Toledo, Ohio, and many other eastern points, and there is a possibility that these shipments may be augmented before the season for shipping eastern bituminous coal to the lake ports is ended.

Indiana mines on the Pennsylvania R.R. have suffered the worst from the car shortage, that road failing by 22.92 per cent. to provide an adequate supply of cars. On this system the car shortage has been enlarged by the shifting of cars to Eastern mines to care for lake shipments. Little relief is promised for this month.

Birmingham, Ala.

Of importance in the Birmingham mining district during the last week was the announcement that the recommendations that the Government take over the Warrior River transportation project had been accepted by Secretary McAdoo, and that in the near future facilities would be established which would afford magnificent opportunities for the handling of a large tonnage of coal.

Not less than 200,000 railroad cars will be released in one year if the coal used at Mobile, New Orleans, and other points in this immediate district is handled by way of Warrior River, and this will be a big item for the mining companies too far removed from the river to attempt to avail themselves of its facilities, as the cars released by the river mines will then be diverted to the former for their use.

The Jefferson County Board of Revenue instructed its engineers to start work Tuesday, July 16, to prepare for the construction of four miles of improved highway from the Cahaba coal field to Birmingham. The object desired in the construction of this road is to furnish facilities for the wagon miners of the Cahaba field to transport their coal to Birmingham via auto trucks. The county is merely asked to superintend the work and to furnish engineers, and the miners and civic association have agreed to supply the funds, approximately $20,000. The miners also proposed should the road be completed within the immediate future they would pay a royalty for its use in transporting coal to Birmingham. The county board has not only accepted this proposition, but at a meeting last Saturday it was decided to start the work immediately, the county engineers to direct the work and county convicts to be worked if necessary.

Victoria, B. C.

The problem of western Canada's coal supply for the winter of 1918-19 continues to engage the attention of the public bodies of the chief cities of Manitoba, Saskatchewan, Alberta and, to a slighter extent, of British Columbia. It also is constantly before the operators of these provinces and, generally, is being faced by the latter by concentration of effort toward the increasing of production.

Recently a civic committee of the City of Winnipeg, Manitoba, visited Calgary, Alberta, to go into the matter of the securing of Alberta coal for that large Middle West industrial center of Canada The members of this organization did not achieve what they set out to do, according to report. They were not satisfied with the cost of the Alberta fuel in Manitoba, where from their statements it retails at between $11.50 and $12 a ton, and they went to Calgary to meet the operators and to ascertain the actual cost of production, in the hope of being able to obtain a clear explanation of what they consider an exorbitant and unwarranted price.

In discussing the information obtained one of the committee members said that it appeared that the coal prices on cars at the mine was $4.95; that the freight to Winnipeg was $4.15; and that approximately $2 had to be charged for administration and cartage. He, therefore, admitted his inability to locate any excessive profit to any individual or individuals in the course of the progress of the coal from the mine to the consumer.

On the whole the committee was dissatisfied with the treatment received, it being stated that the mine owners would not open their accounts to inspection and that they seemed to prefer not to send any coal to Winnipeg rather than to cut prices. The operators also are quoted as having asserted that no dividends were being paid and that, in some instances, money was being lost.

The chief difficulty appears to be as to freight rates and S. C. Oxton, deputy minister of public works for Manitoba, and J. A. McDonald, acting fuel administrator for the Province of Manitoba, were in Edmonton, the capital of Alberta, recently, interviewing the fuel administrators of that province, with a view to discussing the whole situation and endeavoring to devise some means of obtaining a reduction in the freight rates between Alberta and Manitoba.

As the situation stands the leading citizens of Winnipeg as well as other parts of Manitoba prefer the paying of $14 a ton for the anthracite coal of the United States to from $11.50 to $12 a ton for Alberta coal. They are of the opinion that the difference in quality in favor of the imported fuel is so marked that it more than com-

pensates for the difference in price. There is the further point, however, that this winter's developments may make it impossible to get the American coal and the chance of such a contingency, there is no doubt, is creating a feeling of uncertainty and a desire to do everything possible to arrange for a supply from the sister province.

PENNSYLVANIA

Bituminous

Uniontown—Decision to continue the shipment of its entire output of 32,000 tons of coal monthly to the byproduct plant at Youngstown, Ohio, was reached at the annual stockholders meeting here of the Brier Hill Coke Co. The board of directors chosen is composed of J. G. Butler, Jr., George F. Alderdice, W. H. Warren, Thomas McCaffrey, W. B. Phelan and John Allen. Officers elected were Thomas McCaffrey, president; W. H. Warren, vice president; W. B. Phelan, secretary, and N. B. Fulton, treasurer. The company has 470 beehive ovens at Brier Hill, near here, but they have been abandoned since last October, although the plant has been operating steadily at capacity.

Thornburg—The Pittsburg Coal Co. has under agreement of purchase 40 acres of coal about two miles from Thornburg, in Robinson township, at about $800 an acre, or $32,000. The coal is under the tract on which stands the Summit House, and belongs to the owner of that roadhouse.

Kittanning—On July 8 the Furnace Run mine tipple of the Allegheny River Mining Co. was destroyed by fire. The tipple was not only burned but the long retarding conveyor down the hillside was also a total loss. The Kittanning fire department was called and saved the power house and other adjoining buildings. The tipple was equipped with special preparing machinery which will require some time to replace. The loss is estimated at $30,000. The fire is thought to have been of incendiary origin as there was no fire whatever around the tipple over Sunday.

Washington—George H. Thiess recently purchased two tracts of coal lands in this vicinity from the Hemphills. The first tract contains 160.223 acres and is in Independence Township. The consideration was $16 022.30. The second tract, 142.599 acres, in Hopewell Township, was bought for $14,259.90.

J. O. Scott, of Washington, has disposed of the Pittsburgh coal underlying a tract of 131.55 acres in Donegal Township to John A. Bell, a well known coal operator, of Carnegie. The consideration was $13,155.

The Pittsburgh coal underlying the farm of the late Joseph W. Brownlee in Cross Creek Township was sold recently to John Steel, of Greensburg, for $49,000. The farm contains 194 acres and 89 perches, which makes the average price $252 an acre. The Brownlee farm adjoins the farm of the Patterson heirs. The coal under the latter tract was purchased over a year ago by the Pittsburgh-Southwestern Coal Co. at nearly $300 an acre.

Anthracite

Wilkes-Barre—Officials of the Lehigh Valley Coal Co. are planning for a general revision of the colliery system, with the view of reducing the size of the divisions by creating new ones. The purpose is to enable the division superintendents to give closer supervision to their collieries, now that there is such a strong demand for increased production. Information is fairly reliable that the Lackawanna division will be split in two, with the present superintendent, George P. Gallagher, retained in charge of all collieries on the west side of the river. The newly created division on the east side of the Susquehanna will come under the superintendency of Sheldon R. Jones, former inside superintendent of the lower end of the Wyoming division. R. A. Jones, of West Pittston, will be made the division engineer of the newly created district.

Blakely—Thirteen men were burned in an explosion of gas in the Lackawanna colliery of the Delaware & Hudson Co. on July 10, when the floor of the chamber in which they were working caved and the gas from the vein below came in contact with the naked lights of the men. The explosion resulted.

Freeland—The officials of the Harleigh Brookwood Coal Co., which is the company name for the Madeira Hill Co., in Luzerne County, Pennsylvania, held a booster meeting in Hazleton this week. All the company executives in the anthracite field were present at the meeting and dinner. On Saturday morning a fire of unknown origin completely destroyed the Harleigh Brookwood breaker structure and adjoining buildings, causing a heavy loss. This will mean a loss of about 800 tons daily. It is too early to state what plans will be used to keep the output of this mine on the go. The G. B. Markle Co. has a large plant nearby.

Hazleton—Lehigh Valley Coal Co. officials from all the divisions in this part of the state recently held a dinner and production meeting at Hazleton. This was followed by the announcement that in order to further aid in getting out coal the operating management of the company's holdings would be concentrated into smaller divisions, each with its distinctive operating department, including superintendent and mining engineer. Another dinner was given later in the week by General Manager Chase to the higher officials of the company at his Glen Summit home.

WEST VIRGINIA

Williamson—With the organization of a $50,000 company, the incorporators of the Dempsey Coal Co. plan, as soon as the usual formalities can be complied with and machinery installed, to mine coal on an extensive scale at Armor in Mingo County. Those principally interested in the company are Thomas A. Shewey and James Brumfield, of Armor; Lewis Dempsey, of Inez, Ky.; Floyd Brewer, of Warfield, Ky., and J. C. Haley, of Roanoke, Va.

Welch—Former Senator W. W. Whyte, of Welch, W. Va., is one of the leading spirits in the formation of the Tacoma Collieries Co., which has been incorporated as a West Virginia corporation with a capital of $50,000, although the company's operation will be at Tacoma, Va. In addition to Senator Whyte the incorporators are J. Logan Hill, Joe Zeglin, Louis Setany and Frank A. Olasz, all of Welch.

Welch—Impetus has been given the coal industry in McDowell County by a number of new operations, the latest entry in that field being the Browns Creek Coal Co., which with a capital stock of $100,000 has been organized by J. R. Greenwalt and associates.

Charleston—The Gauley Mountain Coal Co., of which R. H. Morris is general manager, is building half a hundred new houses at its Gauley River plant.

Greendale—Approximately $15,000 will be expended in necessary additions and improvements by the Greendale Mining Co. at its plant here.

Greenberry—With a view to increasing its output, The Miller Coal Co. is driving new openings at its plant at this place.

Hartland—R. M. French & Co. have made such progress with the construction of a plant at Hartland on the Coal & Coke Ry. that the company will soon be able to begin producing coal.

Under the direction of W. S. Wood, general manager, the Middle Creek Coal Co. is developing its property near Hartland in the No. 5 block.

Philippi—The Ford Run Franklin Coal and Coke Corporation is among the new companies just formed with a capital stock of $1,000,000. Lee J. Sandridge and others organized the new company, which will develop coal property on an extensive scale near here.

Morgantown—An addition to other companies in the Monongalia field is the Little Falls Fuel Co., which has been organized with a capital of $100,000. This company was organized by J. A. Aronson and others.

Logan—Coal lands will be developed in Logan County by the Donald Coal Co., as soon as plans are matured by Fred Haslip and his associates, who organized the company, which has an authorized capital stock of $50,000.

Morgantown—Prof. A. C. Callen reports that the total enrollment of students in the short coal-mining course, at the University of West Virginia, Morgantown, at the present time is 21, which is by far the largest attendance in this class in the history of the school.

OHIO

Marion—A pile of coal containing more than 100,000 tons, which was stored by the Erie R.R., is on fire, and strenuous efforts have been made to extinguish it. The cause is supposed to be spontaneous combustion.

INDIANA

New Albany—A committee of miners from Knox County has filed a petition with the Public Service Commission, asking for a larger supply of cars and better distribution, claiming that the poor supply and distribution are resulting in their losing 21.5 per cent. of their working time. This condition appears to be true of most of the southern Indiana section.

Terre Haute—Samuel R. Artman, chairman of the Industrial Board of Indiana, following a conference with William E. Stewart, of Terre Haute, Ind., has announced the appointment of Mr. Stewart as state mine inspector, to succeed Michael Scollard, recently resigned. Mr. Stewart is now president of District 11, United Mine Workers of America. The salary of the position, which is under the industrial board, is $2000 a year.

KENTUCKY

Middlesboro—The Lunch (Ky.) mines of the United States Coal and Coke Co. recently set a record for eastern Kentucky, if not a state record, when 59 railroad hoppers, of 55 tons capacity each, were loaded out in a period of ten hours. The company has made numerous improvements and will shortly have a maximum capacity of 12,000 tons daily. Two thousand new houses have been erected for miners.

Barbourville—The mines of W. H. Boggs have been sold at public auction to Byron Campbell, of Rossland, who with Robert Ridnor will operate the property.

Hazard—The Storm King Coal Co., with offices and mines at Jeff, Ky., has been reorganized, the present officers being F. E. Hadley, president; H. H. Coupler, vice-president, and L. E. Yoder, secretary and treasurer. The company is putting in new equipment and improvements to increase the output from 500 tons to 750 tons daily, and is erecting 25 new miner's homes.

ILLINOIS

Freeburg—The Mulberry Hill mine here has been sold for $190,000 to Iowa parties connected with the St. Clair Coal and Mining Co., of St. Louis.

Edwardsville—E. C. Donk, vice president of the Donk Bros. Coal and Coke Co., of St. Louis, announces that the company will start work about Aug. 1 on a new mine one mile south of Edwardsville, intended to have a capacity of 5000 tons a day, which will be 2000 tons a day more than is produced by each of the four large mines now in operation in the southern part of Madison County. The company has acquired a large field south and east of Edwardsville. The contract for the shaft has been let. Mr. Donk estimated that about three months will be needed to sink the shaft to the vein which is to be mined.

Carlinville—Machinery and lumber have been ordered for the local coal mine that Carlinville business men are promoting, which is to be opened just south of the city. C. G. McIntosh, head of the company, announces that coal rights under the property of Anna Stoddard have been acquired.

Foreign News

Winnipeg, Man.—Controller Wallace and Aldermen Queen and Heaps, appointed a committee of investigation into the ability of the western coal fields to supply the demands of Winnipeg, report that in 1916, the total of the coal produced in Alberta was 2,172,801 tons, and in 1917, 2,125,000 tons, while according to Chief Inspector Sterling, fuel controller for Alberta, the production for 1918 is estimated at 3,225,000 tons. The committee is of opinion that this should be sufficient to meet these requirements of the three prairie provinces, provided there is continuous production at the mines; but production can only continue so long as orders are received from dealers and consumers, as there are no facilities at the mines for storing coal. The report, therefore, emphasizes the necessity of ordering coal at once by all able to do so. Regarding the labor situation, the committee found, generally speaking, an ample supply of men available for the time of the year, and believe that as soon as harvest is over the labor supply will be sufficient to meet requirements. As to the relative value of western and anthracite coal, the committee found it difficult to arrive at any conclusion. While it was admitted by all that the heating value of Alberta coal was not as great as anthracite, estimates as to the difference varied from 25 to 75 per cent.

Toronto, Ont.—Experimental work to determine the economic possibility of manufacturing peat briquettes as a substitute for coal, for which an appropriation of $100,000 was made by the Ontario Legislature, has been unavoidably postponed until next year. Two machines of a new design for the manufacturing of peat fuel were ordered by the Ontario Department of Mines early in the spring to be put in operation at the peat bog near Holland Landing. Owing to inability to secure the necessary material, the manufacturer has been unable to supply the machines, which cannot be delivered in time to enable operations to be begun this season. Some experiments on a small scale in the drying of peat with gas engines are in progress near Cochrane,

in northern Ontario, but no solution of the main problem as regards the commercial feasibility of furnishing a peat fuel to compete with coal will be possible for at least a year.

Personals

W. H. Moore, formerly safety inspector for the Canadian Western Fuel Co., has been appointed manager of the new Wakesiah mine, now being opened by the same company.

Thomas Taylor, formerly overman at the No. 5 mine, Comox colliery, operated by the Canadian Collieries (D), Ltd., has accepted a position as overman of the Morden mine, at South Wellington, B. C.

R. L. Douglass, sales manager of the Devoy & Kuhn Coal Co., of St. Louis, Mo., has recently been commissioned a captain in the army, quartered at St. Louis, to see that plants with contracts for the War Department get their quota of coal.

J. Jemson, overman of the South Side No. 1 mine, Nanaimo colliery, operated by the Canadian Western Fuel Co., has been appointed safety inspector to succeed W. H. Moore in that position, and Robert Laird has been made overman to succeed Mr. Jemson.

Obituary

Henry Vogue, who made and lost a fortune in coal mining at Staunton and Edwardsville, Ill., died at a St. Louis sanitarium July 9, aged 82 years. He had been sick for two months, but had eaten a hearty meal just before he expired. One of the first mines at Staunton, a gin shaft, was put down by Vogue. He at first hoisted the coal by mule-power. He prospered, and in later years sank four shafts in the Staunton field. A quarter of a century ago he was one of the wealthiest men of the district. Then he opened the Henrietta mine at Edwardsville, which was not profitable, and he lost in it all that he had made in the others. This mine was recently reopened by the Beck-White Mining Company.

Industrial News

Rockport, Ky.—The Rockport Coal Co. has filed notice of an increase in its capital from $100,000 to $200,000, to provide for business extensions.

Knoxville, Tenn.—The Standard Jellico Mining Co. has recently filed notice of an increase in its capitalization from $25,000 to $50,000, to provide for expansion.

Elizabethtown, Ill.—A. B. Thomas offers to the lowest bidder a contract for sinking a shaft for the Hillside Mines Coal Co., in Hardin County, to the depth of 150 ft. from the surface.

New Orleans, La.—The local office of the Edison Storage Battery Supply Co. has been moved from 201 Baronne St. to larger and more commodious quarters in the Mason Blanche Building. D. B. Mugan is district sales manager.

Columbus, Ohio—An additional appropriation of $3300 has been made by the Columbus City Council for loading equipment for the Columbus municipal coal yard, bringing the total financing up to $15,800, in preparation for business during the fall and winter.

Winton, Wyo.—The work on the new mine of G. W. Harris, at Winton, Wyo., is progressing rapidly. Contract for the coal tipple has been placed with the Roberts & Schaefer Co., Chicago, which equipment will include a Marcus picking table screen.

Frankfort, Ky.—The Lenox Railway Co., of Frankfort, Ky., was recently incorporated by H. M. Collins and others, and plans to construct 15 miles of railroad in Owsley and Morgan Counties, tapping some rich coal and timber lands and connecting with main-line roads.

Pittsburgh, Penn.—The Pittsburgh Mining Machinery Co., First National Bank Building, has been appointed selling agent for Mancha storage-battery mine locomotives in the Pittsburgh district, covering the eastern Ohio coal fields, northern part of West Virginia, Maryland and bituminous fields of Pennsylvania.

Knoxville, Tenn.—The east Tennessee and southeastern Kentucky bituminous coal fields are steadily increasing production, according to E. R. Clayton, district fuel representative, who in a recent statement showed that during the first week in June 269,000 tons of coal were mined; 286,000 in the second week, and during the third week 300,000 tons.

Jefferson City, Mo.—Wallace Crossley, Missouri Coal Administrator, has issued an order that from now on coal delivered to consumers is to be dumped in streets and alleys where bins and cellars are not so accessible that they can be reached without delay. The purpose is to expedite delivery by avoiding delay to teams, trucks and men. The order applies to all the cities of the state.

New York, N. Y.—The Lehigh Valley Railroad Co. transported a record tonnage of anthracite during June, the total amounting to 1,352,820 tons, an increase of 5615 tons over last June. In the tonnage of domestic sizes carried during the present coal year, April 1 to June 30, the Lehigh Valley carried 2,646,491 tons, approximately 350,000 tons more than was carried by any other road.

New York, N. Y.—Reports of exports of coal from the port of New York during May, 1918, show 4444 tons of anthracite at a value of $30,158; 8117 tons of bituminous valued at $58,118, and 2153 tons of coke valued at $30,868. During May of last year there were exported from this port 16,714 tons of anthracite valueu at $133,327, 995 tons of bituminous valued at $7147, and 1900 tons of coke valued at $38,063.

Birmingham, Ala.—The Sloss-Sheffield Steel and Iron Co., will construct 120 Semet-Solvay byproduct ovens in the Birmingham district, with commensurate facilities for taking care of the byproducts, according to an announcement of J. W. McQueen, president of the company, the plant to cost something like $5,000,000. It is stated that the Federal Government has contracted to take the byproducts for use in the manufacture of munitions.

Louisville, Ky.—In compliance with the orders of Fuel Administration, under which southeastern Kentucky is to supply 350,000 tons of coal for shipment into the Lake district, the Harlan district operators will get out 90,000 tons monthly, which will be shipped to the Ore and Coal Exchange at Toledo, Ohio, which will ship ore in and coal out. The Elkhorn district and the Blue Gem district will also make heavy shipments of byproducts coal to the Lake district.

Lexington, Ky.—A number of rumors are floating through eastern Kentucky to the effect that the Louisville & Nashville Railroad Co. has plans for enlarging its terminals at McRoberts and Ravenna, Ky., and that it will double-track its main line between these points in order to facilitate handling shipments of coal from the Elkhorn territory. It is claimed that the work will start this year. The rumors are plausible, as many new mines have gone into the district and the tonnage is very heavy.

Columbus, Ohio—The announcement was made last week that C. F. Mayer, who has been executive secretary of the Ohio Fuel Administration since its start about a year ago, has resigned to take up work in his former position, with the traffic department of the New York Central Lines. He will be succeeded soon by James G. Young, traffic manager of the Columbus Chamber of Commerce, who has also been secretary of the Franklin County Fuel Committee. Mr. Young will hold both positions for the time being.

Newark, N. J.—Plans have been approved for the erection of ten coal pockets with a total capacity of 5000 tons of coal, at Overbrook Hospital, Newark, N. J. They are to be of reinforced concrete and will cost $60,000. The pockets will be connecting receptacles built along the railroad siding at the hospital. A motor conveyor equipment will be installed to permit the rapid moving of coal from any pocket in the event of danger from spontaneous combustion. The system of pockets will be protected by automatic registers that will detect and expose any danger of combustion.

Columbus, Ohio—All of the property of the Sunday Creek Coal Co., which includes leases, land held in fee simple, mining machinery and equipment, will be offered for sale at auction at the Franklin County Court House, Columbus, July 27. The order was issued by Judge Dillon of the Court of Common Pleas. An appraisement of the assets shows a valuation of $2,500,000. John H. Winder has been receiver for several years. John S. Jones, of Columbus, recently completed the purchase of all of the bonds, and the sale is the last step in a complete reorganization.

Toledo, Ohio—A considerable tonnage of coal is flowing from Ohio and West Virginia mines to the Northwest via the lakes, as is shown by the records of loading at the Toledo docks of the Hocking Valley and Toledo & Ohio Central railroads. During the week ending July 13 the Hocking Valley docks loaded 160,000 tons as compared with 157,000 tons the previous week, making a total of 1,495,000 tons for the season. During the same week the Toledo & Ohio Central docks loaded 45,000 tons compared with 61,000 tons the previous week, making a total of 745,000 for the season.

New York, N. Y.—There has been installed in the American Museum of Natural History an exhibit of peat, for the purpose of calling to the attention of the public that what is probably the world's most accessible peat supply is located in the Borough of Queens, between Maspeth and Middle Village. This bog of peat covers an area of about 100 acres, and the peat bed is from 10 to 15 ft. thick. The exhibit includes samples of dried natural peat, dried compressed peat, peat briquettes composed of ground peat mixed with coal dust, and unmixed peat briquettes.

Lexington, Ky.—One of the most important actions taken at a meeting of the Hazard Coal Association held recently was the appointment of a committee consisting of one member from the operating force of each concern, in order to stimulate production. This committee, when named completely, will consist of about 30 men. The plan is to start an educational campaign among the men, showing that they are as important in the winning of the war as the troops in the trenches. Production in the Hazard field has fallen off because of lack of labor and the fact that many miners do not work full time.

St. Louis, Mo.—The St. Louis Fuel Committee, with the approval of Wallace Crossley, Missouri Fuel Administrator, has appointed inspectors to examine coal delivered to consumers with respect to cleanness and weight. Administrator Crossley says that everything possible will be done to secure clean coal and in cases where inspectors have doubts about the weight it will be reweighed. H. G. Martin, assistant superintendent of the Ranken Trade School, has been placed in charge of the investigation of industrial concerns, which are to be reclassified with respect to their importance and efficiency for purposes of fuel conservation.

Fairmont, W. Va.—Charles F. Ice, chief inspector for the twelve and a half counties comprising the Fairmont district, as laid down by the Fuel Administration, has announced four deputy inspectors, effective at once, as follows: C. F. Posten, formerly local inspector of the Elkhorn Coal Corporation, of Fleming, Ky., who will be located at Morgantown. F. F. Robey, formerly tipple foreman and inspector of the Consolidation Coal Co. mine No. 51 at Shinnston, who will be located at Shinnston. U. N. Arnette, formerly general superintendent of the Antler Coal Co. of Fairmont, who will be located at Elkins. C. W. Ferguson, formerly superintendent of the Copen Creek Coal Co. at Bower, W. Va., who will be located at Buckhannon.

St. Louis, Mo.—The Interstate Commerce Commission hearing on the petition of the St. Louis Chamber of Commerce for abolition of the bridge arbitrary of 20c. a ton on coal came to an end at the Jefferson Hotel on the afternoon of July 12. The hearing of testimony occupied three weeks. At the conclusion of the testimony the attorneys for the Terminal Railroad Association and the roads composing it renewed their motion for the dismissal of the petition, on the ground that since it was filed the freight rates have been changed by order of President Wilson, effective June 25, and that therefore the petition does not apply to the present situation. The motion is to be argued before the commission in Washington. It is the belief that a strong case has been made and that St. Louis will get relief from the arbitrary unless technical objections prevail.

Columbus, Ohio—The Ohio Industrial Commission, which has charge of the Ohio Mining Department, has issued a partial statement showing that the coal mined in the Buckeye State for the year 1917 was 41,677,986 tons. This compares favorably with all previous years and is in access of the largest previous production by 5,392,500 tons. The production in Ohio in 1916 was 34,526,552 tons and in 1913, which was the banner year previous to last year, it was 36,285,468 tons. Belmont County as usual is the leader, with 11,156,626 tons. Athens County comes next, with 6,313,619 tons, closely followed by Jefferson County with 5,742,240 tons. Guernsey County produced 4,024,265 tons and Perry County 2,445,114 tons. Hocking County is credited with 2,311,858 tons and Meigs County with 1,267,144 tons. Harrison County had a production of 1,222,561 tons, while Tuscarawas County produced 1,788,800 tons.

MARKET DEPARTMENT

Weekly Review

Prohibition in Mining Districts Would Mean More Coal—Bituminous Production Falls Off on Account of Holiday—Anthracite Situation Serious—Hard Coal Miners Placed in Deferred Draft Classification—Need for Conservation Emphasized.

THE enactment of a law providing for prohibition in coal-mining states would undoubtedly result in the production of more coal. There are many faithful and industrious mine workers, but there are also many who are not applying themselves with the requisite diligence to their important work in these critical times. Weddings, christenings, funerals, feast days, fast days—all furnish opportunities for the pleasure-seeking miner who desires to lay off from work. True, the war spirit has brought about a much better performance on the part of a majority of our miners, but there are still too many whose hearts and hands have failed to respond to the pleas made on behalf of patriotism, democracy, and the country's extreme need for more fuel. The lure of the saloon has resulted in a bending of the elbow—not in the interests of a greater production of fuel, but in the consumption of more liquor.

During the week ended July 6 (the latest statistics available), the production of bituminous coal amounted to 10,259,000 net tons, a considerable falling off in output as compared with the preceding week. This was due to the observance of Independence Day. Contrary to expectations, however, the average production per working day during the week under review maintained the high average of the week before. Naturally, anthracite shipments also fell off in the same week, only 31,493 cars being forwarded, a decrease of 25 per cent. compared with the week preceding.

Owing to the shortage of labor, the production of anthracite is falling below the tonnage counted on by the industry when a distribution program was worked out for the coal year. With added man power, the existing equipment and breaker capacity could get out at least 25 per cent. more coal. Through the loss of 33,000 men in the hard coal regions since the war started, the nation has been deprived of the potential energy sufficient to produce 19,800,000 gross tons of anthracite coal a year.

To prevent a further drain of the already sadly depleted forces in the hard coal regions, Provost Marshal-General Crowder has ruled that all miners and mine workers in these mines be placed in deferred classification in the draft. It is gratifying, indeed, that these workers are to be left undisturbed in this highly essential industry, as their services in the mines are vital to the successful prosecution of the fight against the Hun.

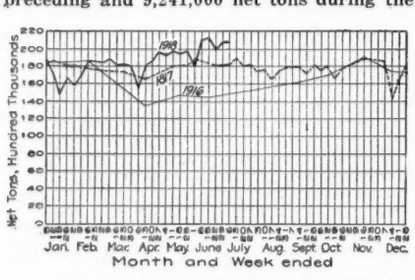
Following closely on the order curtailing the coal supply to brewers to 50 per cent. of their normal requirements, came the announcement that this industry is to receive no coal whatever. The incident which precipitated this order was a statement from the Railroad Administration that 200 additional carloads of coal could be handled through the New England gateways each day. New England's schedule is already far behind, but so closely has consumption followed after production that it was found necessary to divert supplies destined for non-war industries in order to fill the 200 additional cars each day.

While the coal available for use this winter will be intelligently distributed, and no recurrence of the confusion of last winter will take place, the requirements of the war industries are mounting so fast as to make it clear that there will not be enough coal for all. The Fuel Administration is indulging in no predictions as to what will happen to non-war industries, but every effort is being made to bring to the attention of the public the necessity of conserving fuel. Some are anticipating that 50 per cent. of the non-war industries will be forced to suspend before spring from lack of coal.

The work of supplying the domestic consumers with coal is going ahead more rapidly than had been anticipated, and there will be no inconvenience on the part of householders if they practice economy.

COAL PRODUCTION

The observance of July 4 caused bituminous coal production during the week of July 6 to decrease 2,081,000 net tons, or approximately 17 per cent. The total output (including lignite and coal made into coke) is estimated at 10,259,000 net tons as against 12,340,000 net tons during the week preceding and 9,241,000 net tons during the current week of 1917. The average production per working day (five-day week) is estimated at 2,052,000 net tons, slightly lower than the average production per working day during the week of June 29 of 2,057,000 net tons, and 11 per cent. greater than average production per working day during the week of July 6, 1917. Railroad shipments during the week decreased from all districts. Reports from the carriers show shipments from central Pennsylvania decreased 20 per cent.; from western Pennsylvania, 17 per cent.; from district including northeastern Kentucky, high-volatile of southwest Virginia and smokeless fields of West Virginia, 26 per cent.; from Ohio, 13 per cent.; from the district including Illinois, Indiana and western Kentucky, 20 per cent., and from the district including Indiana, Texas and the southwest states, 19 per cent.



Anthracite shipments during the week of July 6 decreased 10,148 carloads, or 25 per cent., the total movement amounting to 31,493 cars.

Beehive Coke—Production of beehive coke in the United States during the week ended July 6 is estimated at 579,000 net tons, a decrease compared with the week preceding of 25,000 net tons, or 4 per cent. The average production per working day is estimated at 97,000 net tons as against 101,000 net tons during the week ended June 29. The principal operators in the Connellsville, Greensburg and Latrobe districts of Pennsylvania report production of beehive coke during the week ended July 6 at 348,178 net tons, their plants being operated at 76.7 per cent. of their present capacity as against 77.4 per cent. during the week previous. Slightly greater losses due to insufficient yard labor were reported during the week.

Byproduct Coke—Operating conditions in the byproduct industry changed but slightly during the week ended July 6. The plants were operated at 90.3 per cent. of their present capacity. Out of total losses of 9.7 per cent., 0.8 per cent. was due to shortage of byproduct coal, 2.2 per cent. to labor shortage, 5.2 per cent. to repairs to plants, 0.1 per cent. to "no market" and 1.4 per cent. to all other causes. Improvement was reported during the week from plants in Illinois, Massachusetts, New Jersey and West Virginia. The operators in Illinois and Massachusetts attribute the increased production to repaired plants, in New Jersey to better supply of coal and repaired plants and in West Virginia to repaired plants and other causes. Kentucky was the lone state reporting a decrease in production. The capacity of the plants reporting increased 8163 net tons during the week of July 6, due to the operation of a new plant in Ohio by the American Steel and Wire Co. at Cleveland and the operation of a new plant in Pennsylvania by the Carnegie Steel Co. at Clairton.

CARLOADS OF COAL ORIGINATING ON PRINCIPAL COAL-CARRYING ROADS

	Week Ended: June 15	June 22	June 29	July 6
Bituminous shipments, 123 roads.	222,892	212,849	219,625*	180,200†
Anthracite shipments, 9 roads...	41,960	41,170	41,641	31,493

* Revised from last report. † Subject to revision.

BUSINESS OPINIONS

American Wool and Cotton Reporter—Manufacturers are hoping to see lower quotations for wool, and there is some basis for expecting these lower prices. Wool has undoubtedly been accumulating, and if there is to be some trade development which will prevent other countries than the Allies from obtaining a reasonable supply when the war

terminates, the pressure of raw material stock might easily reduce quotations. The radical decline in the price of cotton on the official announcement of the cotton crop prospect was expected. While many thought the decline would continue gradually, the price nevertheless advanced nearly enough to counteract the previous decline.

Bradstreets'—While governmental control looms large in the general situation, and though movements on civilian account tend to narrow at the more important centers, zones close to the surplus crop growing regions report remarkable demand for this stage of the year. Buying of essentials is heavy, and though price-fixing on a lower scale has deterred operations in cotton goods, purchasers are more anxious to put out orders than sellers are to accept them, the newness of price regulations having rendered commission men chary about taking on heavy commitments.

Dry Goods Economist—The chief interest in the textile world shifted from wool to cotton when the announcement was made that the price-fixing committee of the War Industries Board had reached a decision as to what was a fair price of certain grades of cotton goods. The Board tackled only print cloths, sheetings and ducks, leaving other classes of goods for future consideration. In the case of the three classes of weaves "proper" prices were named for goods of standard counts and weights, in the gray—that is, the unbleached and unfinished fabric in the condition in which it left the loom.

Marshall Field & Co.—Wholesale distribution of dry goods for the week is substantially ahead of shipments for the corresponding period a year ago. Road sales for immediate delivery show a good increase over those of last year, while sales for future delivery are slightly under the figure for 1917. Customers have visited the market in about the same numbers as in the same week a year ago. Collections are normal.

Atlantic Seaboard

BOSTON

Volume all-rail gradually mounting toward quota, but deficiency since April 1 not being made up. "Budget" figures have not yet been reached. New England interested in prohibition talk. Railroad reserves creeping up slowly. Hampton Roads situation serious. Cargoes had to be found last week for twelve steamers waiting at the piers. Two hundred cars daily ordered to tidewater from western shipments in high volatile districts. Announcement that Pocahontas and New River contracts cannot be filled is believed soon to be forthcoming. Shipping begins to accumulate at loading ports. Occasionally necessary to divert steamers en route to Baltimore. Dr. Garfield's statement after visiting Hampton Roads causes comment. New England Fuel Administration enlarges organization to prepare for months ahead. Anthracite drops behind the June figures. All-rail movement fair, and demand keeps up for steam sizes.

Bituminous—To the first of the week the movement of bituminous all-rail had increased to such extent over the May average that the trade was much encouraged. As between different requirements, however, shipments are uneven and the situation calls for the closest kind of policing and supervision. "Jobbers," especially those of the mushroom character who have sprung up under "regulation," are having heavy consignments come through; but in cases where deliveries are in their own names without disclosing the ultimate consumer or distributor, the New England Fuel Administration is diverting the coal either to retailers or to industries who are on Preference List No. 1. A lot of this coal is started for "retail dealers" who never retailed before, and there are plenty of instances where the definition "physically handled" is being used in a way not to be recognized by those who framed it. Operators in considerable number are apparently shipping freely on orders of this kind and passing over the patrons they have had for years. Such cases are a hard test of one's faith in regulation, at least as now practiced.

The fact remains, however, that the volume of coal all-rail has much improved. Average daily receipts at the five gateways for the first 12 days in July were 616 cars of commercial bituminous. This is on a basis of approximately 4300 cars per week from central Pennsylvania, northwestern Pennsylvania, and the Westmoreland districts together. This is somewhat over the summer weekly quota for Central Pennsylvania alone, but is considerably short even for the "budget" the three districts are supposed to furnish all-rail.

Washington has made a new program with regard to New England supply. Most of the changes are in the sources for railroad fuel, the latter being decreased from central Pennsylvania and increased from Westmoreland and from Fairmont. The result is a diminished burden upon the Altoona district for railroad supply, but it is doubtful if the volume of commercial coal for New England will be at all increased thereby. The great anxiety of operators over possible congestion at the New England gateways because of increased movement is not borne out by the actual situation. The New England roads are handling comfortably all that is delivered to them and the volume can be increased a lot more before cars will be delayed at the junction points or elsewhere.

The railroads are building up their reserve stocks only with great difficulty. Receipts of railway fuel all-rail still average considerably less than 150 cars daily from commercial consumers. After a fortnight of strenuous effort the Boston & Maine has increased its reserve only three days' supply, and it still stands at a point some 300,000 tons less than a year ago. The other railroads are only in less urgent position, and when the New Haven gets its storage depots in shape to take on coal a big movement will be needed in that direction. Cargoes as they arrive are being requisitioned more or less regularly for two of the railroads, and there is every prospect this practice will continue.

The most acute situation just now, however, is at Hampton Roads. Boats are arriving from day to day without coal being available. A week ago there were 49 steamers and barges aggregating 173,000 tons waiting at the piers, against a total available coal tonnage of 98,000. This week the number of vessels has increased to 60. Through strenuous representations to Washington Mr. Storrow was able to get coal for twelve steamers that were otherwise unprovided for. Three of these had to be intercepted on their way to Baltimore because congestion was also beginning to threaten at that point.

As an emergency measure 200 cars daily were ordered out of western shipments from the Kanawha and other high volatile sections along the Chesapeake & Ohio and again, late last week, a general embargo was put into effect on all west-bound coal. The increase in high volatile should clearly be made permanent, for this grade is in extremely short supply for all purposes. If the Westmoreland and other districts shipping to this territory all-rail are instructed to show preference in low sulphur coals for gas-producing requirements, it will be all the more necessary to build up the volume of coal from Kanawha and other high volatile districts accessible to Hampton Roads in order to relieve the needs of New England railroads.

Anthracite—For the first 12 days in June the average receipt of domestic sizes all-rail were 502 cars daily. This is a good showing, but it is not yet up to the June mark. Steam sizes are still coming through in good volume, the average for the mine period standing at 167 cars daily.

Retail dealers who have neglected making reports of receipts and stock on hand have been systematically notified, usually by telegraph, that their supplies will be shut off unless returns are made promptly. It should be said in defence of New England, in view of statements handed out to the press, that the number of delinquents is misleading. For instance, the Fuel Administration has names of 1200 "dealers" in Massachusetts alone who at one time or another have received anthracite in quantities from a carload up. Some of these were never in the retail coal business and others withdrew years ago. Yet they get telegrams from Washington! The list should be edited by someone in Massachusetts.

There are signs of slowing up on deliveries of steam sizes, but the demand is still strong. Plants of all kinds are accumulating buckwheats and nut in anticipation of shortage later on.

NEW YORK

Dumpings at the New York tidewater piers fall behind and the demand for coal continues. Discontinuance of shipments to three states may help local situation shortly. Demand for state fuel administrator keeps up. Labor shortage hinders bituminous production.

Anthracite—The smallness of stocks and the continued urgency for deliveries stand out as the prominent features of the situation. Dumpings at the New York tidewater docks were about the same as the previous week but local deliveries are far short of requirements. On the other hand most dealers admit having delivered more of their winter orders than they have under normal conditions. In some localities near New York dealers claim to be a month ahead of the season.

There is little difference in the amount of domestic sizes including Pea coal and Buckwheat No. 1 available. The latter is practically a domestic coal now.

Some shippers look for an improvement in supplies as a result of the orders issued by the anthracite committee of the United States Fuel Administration prohibiting shipments of the domestic sizes including Pea coal to 29 communities in Delaware, 72 communities in Maryland and 75 communities in Virginia. The committee has also issued a warning to producers and distributors who have already made shipments to a number of small towns and communities in excess of their whole 1918 obligation based on the 1916-1917 tonnage plus increased percentages. Suspension of such shipments is ordered and action must be taken to prevent a repetition.

The committee also says there are some instances where producers and distributors have actually shipped coal this year to communities into which they did not ship any at all during 1916-1917. This has also been ordered to stop, otherwise drastic action will be taken. Complaint has been received that insufficient tonnage is being furnished for domestic consumption to various towns and cities in New Jersey and Pennsylvania and the committee directs that regular shippers to these points arrange at once to forward the normal amount of tonnage plus the increased percentage.

The demand for a successor to Albert H. Wiggin, who resigned as state fuel administrator, is likely to bear fruit shortly, according to a letter received here a few days ago. The trade is fearful that the delay will cause a greater shortage here than would have resulted had the state been properly represented.

Consumers in Kings County who placed their orders early in April and who have not already received their coal will be compelled to pay for it at the price at the time of delivery, according to a decision of the local fuel administrator.

Shippers believe that the situation is going to be considerably better in the fall and winter, due to the heavy storing now going on in consumers' bins.

There is a heavy call for rice and barley with quotations for individual coal ranging from $3.10 to $3.25 at the mines and for individual barley ranging from $2.10 to $2.50 at the mines.

For the seven days ended July 15 there were 6870 cars of anthracite dumped at the local tidewater piers, a decrease of 81 cars from the number dumped the previous week. For the first half of July there have been dumped at the docks 14,025 cars of anthracite as compared with 14,648 cars dumped the first 15 days of June, a decrease of 623 cars.

Current quotations, per gross tons, f.o.b., tidewater, at the lower ports are as follows:

	Circular	Individual		Circular	Individual
Broken	$6.75	$7.50	Pea	$5.20	$5.95
Egg	6.35	7.10	Buck	5.10	5.90
Stove	6.60	7.35	Rice	4.65	5.10
Chestnut	6.70	7.45	Barley	4.15	4.30
			Boiler	4.60	

Quotations for domestic coals at the upper ports are generally 5c. higher on account of the difference in freight rates. Prices for buckwheat, rice, barley and boiler are not fixed by the Government.

Bituminous—Lack of labor continues to be the predominating feature in the situation, while the shortage of supplies continues to be such that as the season is rapidly passing building managers are becoming worried as to the prospects for next winter's fuel.

Conditions here show a slight change for the better. Some shippers report having been offered a few cargoes at alongside quotations, which were said to include the additional 35c. commission allowed jobbers. There was a decided scarcity of free coals, however. Regular customers, as a rule, received medium supplies and some are reported as having fairly good-sized stocks on hand.

The demand keeps heavy due to the expansion of war industries and the desires of manufacturers to prepare themselves for future consumption. Producers are ready to do their part in eliminating as much as possible the inevitable shortage which the country will face next winter, but there is a lack of labor which can hardly be overcome.

The demand that shipments to New England from this harbor shall be increased rather than diminished, notwithstanding the local demand is likely to continue since it is reported that the prospects of getting

more coal into the East from the Southern ports is less encouraging.

Production figures from the central Pennsylvania fields for the week ending June 29 show 1,142,420 tons of coal mined, the loss by reason of car shortage is estimated at 46,806 tons.

The dumpings at the local docks for the week ended July 15 were 6913 cars as compared with 7089 cars the previous week, a decrease of 176 cars. For the first 15 days of the month there were 14,202 cars of bituminous coal dumped here, as against 15,315 cars dumped during the first 15 days of June, a decrease of 1113 cars.

Current quotations, based on Government prices at the mines, net ton, f.o.b. tidewater, at the lower ports, are as follows:

	Mine Gross	F. o. b. N. Y. Gross
Central Pennsylvania:		
Mine-run, prepared or slack	$3.30	$5.45
Upper Potomac, Cumberland, and Piedmont Fields:		
Run-of-mine	3.08	5.23
Prepared	3.36	5.51
Slack	2.80	4.95

Quotations at the upper ports are 5c. higher.

PHILADELPHIA

Anthracite shipments under quota. Dealers discouraged and believe relief far in distance. Domestic production decreasing. Retailers called on for more statistics. Producers taken to task for irregularities in shipping. Domestic buckwheat demand growing. Plants equipping for smaller steam sizes. Bituminous shows improvement. Good shipments arriving. Car supply good. Labor fair. Wagon-mine ruling not effective yet.

Anthracite—Shipments to this city have not improved, and there continues to be a slowly increasing pressure from the consumers for their coal. There is more coal stored away in the cellars of consumers than ever before, but when it is considered that last year established a record both in production and buying on the part of the public, and that there was a shortage during the winter, the seriousness of the present situation is realized. Production of fresh-mined domestic sizes is slowly dropping behind from month to month, and that explains the activity of the Fuel Administration in depriving manufacturing plants of buckwheat. The administration has limited the consumption area for anthracite and in addition has added two more counties of this state to the embargo list. This week a list was issued of about 25 counties in Virginia to which all shipments of anthracite are embargoed.

Retailers continue their efforts to get more coal, but without avail. Many of them seem resigned to the idea that heavier shipments will not be received for some weeks to come. In the meanwhile they continue to maintain their delivery organizations as fully as possible. One frequently hears of dealers who claim to be doing business at a loss on account of the lack of coal.

This week dealers were called upon for information concerning their business. They all received letters from the General Director of Distribution at Washington advising them that coal for domestic use is to receive preference in shipment and requesting weekly reports on a form provided by the Government. Information is desired as to the deliveries for domestic use, as well as to other dealers and to industrial plants. They must also show the number of tons on hand, their receipts and the coal en route.

The retail men are asked to report the aggregate annual tonnage handled by each, showing anthracite and bituminous separately; the aggregate amount in dollars of their 1917 business; the approximate aggregate amount invested by each in the coal business and the approximate number of men employed.

It is now quite a task to find a dealer who is willing to accept any additional business, and one large concern in the city, that had ceased taking orders several weeks ago, has unfilled orders for domestic coal alone amounting to over 100,000 tons.

Judging from a letter sent out this week to the various "producers and distributors" by the secretary of the anthracite committee of the United States Fuel Administration, all of them have not been governed entirely by the rules laid down by that body. Attention is called to the fact that up to the present time shipments in excess of the whole 1918 obligations, based on the 1916-17 tonnage, plus increased percentages, have already been made to a number of small towns and communities. Immediate action is ordered to suspend shipments to such points and to prevent it in any other direction. The letter states there are instances recorded where the producers and distributors have consigned coal this year to communities into which they did not ship any coal during 1916-17. They are advised that such practices must stop at once unless proper authority is received in advance. The committee threatens "drastic action" against delinquents.

Another matter likely to upset tonnage calculations is the fact that the army cantonments have not yet begun to take their full requirements of fuel. When these shipments begin in earnest there cannot be the least doubt, as last year, that everything will be put aside to take care of this tonnage, which is likely to be even heavier than last year.

There continues to be a moderately increasing growth of the domestic buckwheat trade. As indicated recently, the really foresighted dealers are taking all they can procure and this number is being occasionally added to. We recently learned of a dealer who never heretofore handled this coal but was surprised to find that two cars had been shipped to him. He raised no question whatever and dumped the coal.

The prices per gross ton f.o.b. cars at mines for line shipment and f.o.b. Port Richmond for tide are as follows:

	Line	Tide		Line	Tide
Broken	$4.90	$6.25	Buckwheat	$3.40	$4.45
Egg	4.50	5.85	Rice	2.90	3.80
Stove	4.75	6.10	Boiler	2.70	3.70
Nut	4.85	6.20	Barley	2.40	3.30
Pea	3.45	4.70	Culm	1.25	2.15

Bituminous—This week the soft coal trade has a more favorable aspect. Many of the mines, in fact most of them, report they have received practically as many empties as they can use. It is thought that this condition is partially due to the congestion of empties on account of the protracted Fourth of July holiday.

Good shipments have come into this territory recently and some plants have stocks much heavier than they have ever had at this time of the year. As a matter of fact the essential plants are in good condition as to the future, with coal piled high. These piles in many instances are thicker than they actually should be when the liability to spontaneous firing is considered. The heads of plants realize this and they are simply taking a chance, claiming that they have made preparations to handle such a situation should it arise.

While there has been much talk as to withdrawing all cars from wagon mines, yet this order does not seem to have been generally applied. A tour of the region this week discloses that many of these small operators continue to haul coal to the railroads for loading. There are also some murmurs of dissatisfaction as to this ruling, not only from the owners of the small operations but from the local consumers who are expected to purchase this coal. As the majority of these operations produce an inferior grade, the consumers tributary thereto do not feel that they should be compelled to take it, but want to be allowed to procure their supply as they have heretofore.

BALTIMORE

Increasing shortage is the cry from both ends of the coal trade here. Bituminous receipts continue light, and much poor coal keeps coming in. Anthracite men are genuinely worried, as each month shows a deficiency, and there is now a threat to cut the state's allotment.

Bituminous—There can no longer be a doubt but that soft coal distributors here, and this includes many of the Government fuel administrative force, are feeling genuine alarm over the fall and winter outlook. Instead of the shipments arriving during June and early July coming in such amount as to enable some stocking up for the winter, the tonnage has been scarcely able to meet urgent demands. Indeed, a number of industries have eaten into their scanty stocks in such fashion as to force an appeal to the state fuel administrator for some sort of preferential aid. This aid for the most part has consisted merely in sending the name to Mr. Brydon, the district representative, who now has a long list of requests beyond any apparent possibility of early shipment.

Not only are the receipts here light, but there continues a flow of bad coal that is discouraging. Following a complaint of ice manufacturers that they were frequently unable to get more than 60 per cent. efficiency out of the coal sent them, several other industrial groups have complained.

Even the cement makers, on a preferential shipment list, have not been without their troubles over poor grade coal recently. The 50c. per ton reduction in price plan of the Government to encourage clean coal does not so far seem to be working well.

A considerable tonnage is being received here for Government shipping account, and this movement has led some to confuse the general supply situation with it. Thus one Government official announced that the mines were not getting out tonnage because of poor rail movement, and another said that there was no trouble with the tonnage movement to this section, as it was up to normal. The real situation is that coal for ordinary industrial use is extremely scarce.

Anthracite—There can be no element of doubt about the anxiety of the anthracite handlers here. The receipts are far below the tonnage allotment announced for Maryland, despite the fact that a considerable amount of the shipments are also being diverted to war industries and other parts of the state than Baltimore. The spring and summer months have piled up such a deficiency that there is stronger talk of cutting down the two-thirds supply basis on orders until a betterment is in sight, in order that all may get at least a little coal.

The threat that is heard from the anthracite committee that the state's allotment may have to be cut is causing great anxiety, as the situation is bad enough as it is. A number of country clubs near Baltimore will be hit by the order that they cannot burn coal this winter. The wood fire seems to be the only solution, and for some of the clubs that will not be a happy one, as they are not equipped for adequate heating in that manner. Likewise a number of extensive private greenhouses are cut out from burning hard coal, and the plan to heat but half by bituminous will cause severe floral losses hereabouts. Wood-burning may come to the relief of some who can get wood without having it shipped by rail, which method will be banned as far as can be learned here.

Lake Markets

PITTSBURGH

No coal for stocking. Heavy extra demand for Lake shipments. Market narrow.

R. W. D. Gardiner, coal distributor for the Pittsburgh district, states positively that there must be no stocking of coal by manufacturing consumers or retail dealers prior to Oct. 15. This determination was reached as a result of the demand of the national Fuel Administration late last week that the Pittsburgh district increase its lake shipments as much as possible, over the 1,300,000 tons originally allotted for July, following 900,000 tons assigned for June. The Navy demands for smokeless coal will fall so heavily upon West Virginia and Kentucky that those districts may not be able to contribute any of their quotas to the Lake trade and a heavy burden accordingly falls upon the Pittsburgh district and Pittsburgh No. 8, in Ohio. The Pittsburgh district's production in July is expected to be 4,500,000 tons or a trifle over, and more than one-third of the output must go into the Lake trade if there are to be heavier Lake shipments than the 1,300,000 tons orginally set for the month.

Mr. Gardiner points out that the Lake coal shipping districts are in different position from other districts, in that the heaviest demands upon them occur in the summer, and stocking is therefore out of the question. If the plan succeeds, to have all Lake coal away from mine by Oct. 15, there will be a period in which large stocks can be accumulated, equivalent to the amount released. Meanwhile anyone who attempts to stock coal is likely to have his supply shut off and those who have stocks may be required to use them.

The local coal market has been narrow and is likely now to be much narrower. The market remains quotable at the set limits: Slack, $2.10; mine-run, $2.35; screened, $2.60, per net ton at mine, Pittsburgh district, brokers being permitted to charge 15c. brokerage to consumers.

BUFFALO

Trying to get more anthracite locally. Movement by lake still light. Bituminous as hard to get as ever. Claims that the miners are idle.

Bituminous—The situation has not changed materially. Jobbers are making every possible effort to get more coal to handle, but with no further success. The mines are not favoring them, as is always the case when coal is in greater demand than supply. As this state of things is likely to continue indefinitely the outlook is not pleasing. Some of the jobbers report that their business is improving but as a rule they are still waiting for business to come their way. It is the idea of the trade in general that the Government does not think the wholesaler is needed in business.

The prices of bituminous, though supposed to be so rigidly regulated, are not as definite as they should be in the minds of shippers. They mostly have to figure considerably before making a quotation. Following are the latest figures: Thin vein Alleghany Valley, $4.65; Pittsburgh lump, $4.45; Pittsburgh mine-run and slack, $4.20; cannel, $6.15; smithing, $5.85, all per net ton, f.o.b. Buffalo, with jobber's profit added.

There is much figuring out of supply and needs of coal here by the fuel authorities, both in bituminous and anthracite, with the result, commonly, that some new consumer is listed as unnecessary and likely to be cut off soon. The breweries, for instance, are now down to half supply, but it is expected that in a few days they will be shut off entirely.

Anthracite—The local fuel authorities are looking for an allotment to this territory, after which an effort will be made to obtain more coal. As it is the city trestles are idle most of the time, sometimes not running more than two or three days a week. This does not mean that the mid-summer movement is smaller than it used to be, but the demand is so urgent that if the coal could be obtained it would be brought in so as to stop the complaining.

The movement to Canada is light at present and the loading of lake vessels has not of late kept up with that of May and June. The demand for this coal seems to be too heavy in the direction of the war camps and for export to afford a full supply this way. The amount loaded for the week was 88,470 net tons, when an average of more than 100,000 tons has been the rule during the summer months.

The distribution was: 33,400 tons to Duluth and Superior, 17,570 tons to Chicago, 17,400 tons to Milwaukee, 8200 tons to Sheboygan, 5900 tons to Manitowoc and 5600 tons to Fort William.

Freight rates continue quiet at 60 to 65 cents to Chicago, 50 cents to Sheboygan, and Manitowoc, 55 cents to Milwaukee and 48 cents to Duluth and Fort William.

CLEVELAND

Car supply at southern Ohio mines has improved so greatly in the past week that shipments of bituminous are coming forward at a faster rate than at any time so far this season. The lake movement has been accelerated and, though many freighters are going up light, the Fuel Administration at Washington is expecting July to be a 5,000,000-ton month.

Bituminous—The middle of July sees bituminous shipments the best of the year to date. Car supply in the Pittsburgh seam district of southern Ohio, where Cleveland and northern Ohio get their supplies under the zone system, is reported to have been practically 100 per cent. on all lines in the past week. In fact, operators declare that at some mines there have been days when more cars were set than could be loaded. Inasmuch as shipments up the Great Lakes still are not all that could be desired, it is believed more coal than ever is going now into stock piles and cellars. Contracting continues at a low ebb; in fact, some operators say they have not made one for 90 days. Inquiry for harvesting coal—quite a factor in northern Ohio and Indiana with some No. 8 district operators at this time of the year—is coming in. More coal is to be seen on sidings and main lines between Cleveland and the mines than in over a year. The abolition of preferential car supply is working out excellently. Little has been heard here for the past two weeks of the "buy your coal early" movement. Latest statistics available at the office of the Pittsburgh Vein Operators' Association, for the week ended July 7, place shipments to the Great Lakes at 2105 cars; railroad fuel, 1151; Ohio, 1183; Michigan and Indiana, 138; and Canada, 54. These shipments were made as follows: Over Baltimore & Ohio, 2058; Pennsylvania lines, 1244; Wheeling & Lake Erie, 1228, and New York Central, 101.

Anthracite—Under the zoning system practically the only anthracite seen here is a few carloads a month, and no market for it exists here.

Lake Trade—One big shipper of bituminous up the Great Lakes who has just returned from Washington declares that the Fuel Administration is expecting July to break all records. Officials will be disappointed if shipments do not reach 5,000,000 tons, he declares, though July's quota is 4,500,000. The record month for the Great Lakes was September, 1917, when 4,900,000 tons of bituminous went forward. More coal cargoes have been available in the past week, but many freighters have gone up light. Iron ore is coming down at a record clip, and some cars that might be in the lake coal trade are engaged in expediting iron ore shipments off the docks to the furnaces. An extra effort is being made at present to get the Northwest's coal up as early as possible, since the ore season will be finished early in the Food Administration wants as many carriers as possible to go up light in the fall in order to speed the down movement of grain. It is figured that every lake cargo of grain releases so many freight cars that can be otherwise employed, and this indirectly will have its effect upon the coal industry. In the week ended July 6, which was a 5-day one, 747,535 tons of coal were dumped into freighters. In the week ended July 13, with the return for the final day estimated, the number of cars dumped totals 19,900 cars, which is better than 900,000 tons.

DETROIT

Neither steam nor domestic coal is reaching Detroit in satisfactory volume. No improvement in anthracite. Lake shipments are below schedule.

Bituminous—Complaint is still coming from jobbers and wholesalers that the movement of coal into the local market is much lighter than Detroit should be receiving to meet current requirements of consumers of steam and domestic stock, and provide adequately for reserves. While the supply reaching the city seems to provide fairly well for needs of industrial plants, little remains for storage. Most of the stock is mine-run. Slack and prepared sizes are received in much less quantity, and jobbers say there is considerable deficiency in supply of domestic bituminous.

State and county fuel administrators, and the dealers also, are striving to stimulate early buying by householders, in the effort to provide as far as possible for needs of next winter while transportation conditions are favorable; but the diminished volume of receipts is proving a troublesome handicap to the success of the campaign.

Anthracite—Uncertainty continues a prominent factor of the anthracite trade. Shipments are so small that retailers have made almost no progress in distribution. The gross margin allowable to dealers has been fixed at $2.50 a ton. Though the amount is unsatisfactory and is called inadequate, an appeal to the dealers on the ground of patriotic duty, which was made by James Couzens, chairman of the Wayne County fuel committee, influenced its acceptance. Regulations for distribution of anthracite were issued to the dealers by the state fuel administrator.

Household consumers using base burners are allowed their requirements up to six tons. Stove and chestnut sizes are to be reserved especially for users of base burners. Consumers having hot-air furnaces are to have one-half their normal supply of anthracite and are required to purchase one ton of bituminous for each ton of anthracite. Consumers operating steam or hot-water heating plants must provide themselves with fuel other than anthracite, as they are allowed none. This regulation has evoked a storm of protest. Violation of the regulations by dealer or consumer renders him liable to a fine of $5000 or two years in jail or both.

Lake Trade—Expectations of vesselmen and shippers are not being realized in lake shipments. Loading is short of schedule, which requires about 1,200,000 tons a week.

COLUMBUS

A good demand for all grades of coal characterizes the coal trade in central Ohio territory. Domestic buying is more active, and the lake movement is heavy.

The coal trade has developed a strong buying demand for all grades of coal—domestic, steam and lake. The lull in the domestic business is gradually passing, and retailers are now in the market for more tonnage. Steam and lake trade are both strong, and on the whole the tone of the industry is generally satisfactory. Production has been increasing under the influence of a better car supply.

Domestic demand is one of the strongest points in the market. Dealers are having a better run of business as consumers have been placing orders rapidly. Orders are both for immediate and deferred delivery. Retail stocks are low, as dealers have been unable to accumulate much surplus in the face of the heavy trade. The Franklin County Fuel Committee is supervising deliveries with a view of preventing hoarding in case such a thing should be attempted. Retail prices are firm at the higher levels announced several weeks ago. Still higher prices are in prospect when the new freight schedules are thoroughly worked out. Pocahontas is quite scarce in the local market. There is a considerable tonnage of West Virginia splint and New River arriving. The main fuel in the local market is Hocking, which is arriving in large quantities.

The steam trade is active also, as many of the smaller consumers are now in the market in an effort to get some surplus stock. This desire has not been gratified, as many difficulties are encountered. The demands for lake shipment are restricting steam tonnages in all sections. Schools have received the greater part of their fuel requirements. Public service concerns are looking around for a larger tonnage and state and public institutions are also in the market. The demand for threshing coal was extra heavy and taken care of by orders from the State Fuel Administration.

Production has been increased slightly because of a better car supply. This was especially noticeable in the Hocking Valley and Cambridge fields. Eastern Ohio still reports a car shortage, which coupled with labor shortage has been restricting production. In fact there is a growing labor shortage in every section of Ohio. This is due largely to the draft, which has taken hundreds of miners.

The lake trade is still active, and every effort is being made to rush a large tonnage to the head of the lakes. Reports show that there is a shortage from estimates made earlier in the season. The boat movement is active, as the ore trade is moving along without friction.

CINCINNATI

Market continues strong, with demand active and supply good. Car situation was not so good last week, but is expected to improve.

The steady demand for all varieties of fuel, from both industrial and domestic consumers, continues to take care of the large production being turned out and shipped from the mines in this section, and there is no surplus of supply over demand, making the situation ideal, as it has been for some time, from the standpoint of the trade. Domestic consumers, by placing in their basements practically their entire winter's supply of coal are making arrangements by which they will be better taken care of than ever before, and indications are that the entire current production of the fall and winter season, with the exception of the relatively small quantity required for emergency use by the poorer classes, will be available to meet the needs of the manufacturers and public utilities, who cannot possibly place in reserve storage enough coal to meet all of their requirements. Except in the New River district, where the Government's needs for the navy are being met, the car supply was not so good last week as usual, but this is expected to be remedied at once with increasing deliveries of new cars. Labor conditions are excellent at present, both as to the supply of men and their spirit; but operators are anticipating with gloom the effect of coming drafts upon their forces, inasmuch as the Government has not yet seen the necessity of exempting coal miners of all ages from military service. This measure has been urged as vital, and it is still hoped that it may be adopted.

LOUISVILLE

Demand for both steam and domestic running heavy, with dealers unable to supply domestic promptly. Production showing improvement in both fields. Car supply satisfactory, and considerable improvement in labor conditions.

The most important progress of several months has been made in the eastern Kentucky field during the past few days. It is reported that considerable labor which has been employed on farms, or working small holdings, has drifted back to the mines, resulting in a much better supply of labor and larger production. The car supply in June was much better than during any recent month, and there has been a good increase in production all around. The situation in western Kentucky has also shown some improvement, due to better car and labor supplies.

Kentucky and the Southern States dealers are becoming concerned over the future supply, as not enough coal is being received to take care of stocking orders, and no surplus stocks laid up. The situation is not very bright, and no improvement is in sight until the large shipments of coal now going to the Lake districts are completed and coal is again running to the small dealers.

The supply of eastern Kentucky coal reaching the Louisville market is now very light, and indications are that little of this grade will reach here until late in the year. Some Hazard coal, which is not a byproduct coal, is being received, and this with the western Kentucky grade is about the only coal that is being sold to any extent. Orders in a retail way are coming freely, and there is also a good demand for steam coal. No surplus stocks are in the yards, and it is now taking retailers ten days to three weeks to make deliveries on domestic stocking orders. On orders placed before the rate advance became effective the consumer is being forced to pay the increase, except where stipulations were made in advance.

BIRMINGHAM

Demand for domestic and steam coal shows no abatement. Supply and production about even with that of past weeks. Improvement in labor supply expected as result of coal mines being placed on priority list in the distribution of labor. Car shortage reported in a few instances.

Efforts of mine operators and fuel administration officials are now centered as never before on measures for increasing the production of coal in the Alabama field. The scarcity of labor and delay incident to delivery of material and equipment used in the industry are now the only serious factors crippling the production. A better labor supply is expected within the next week or two by the transfer of men from non-essential industries to the coal mines and other industries placed on the priority list for man power.

The requirements for steam coal are heavy, and much in excess of the supply under existing operating conditions. Railroads have fairly well provided for their fuel for the coming year, though of course the anticipated requirements have not been fully taken care of.

A steady and persistent buying movement is being maintained in domestic channels—both wholesale and retail—each month showing a substantial gain in the tonnage of storage coal. As one distributor expressed it, consumers are as much perturbed over securing their coal supply as if it had been announced that the domestic mines would close down about Sept. 1. Stocks in local yards are not accumulating, deliveries about offsetting receipts.

Coke

CONNELLSVILLE

Supplies practically adequate. Efforts to secure better labor performance. Narrow market.

Coke supplies at blast furnaces continue practically adequate but there is rarely any surplus to put into stock. Furnaces which had accumulated some stocks had no occasion to draw upon them after Independence Day, as production did not fall off at that time. Operators had made every effort to encourage men not to celebrate in the usual manner and their efforts were fairly successful. The campaign to educate the men to doing a full week's work every week, as a war service, has only begun and while hopes are entertained that this activity will be of some benefit it is the common opinion that absolute prohibition is the only really adequate remedy. It is maintained that even if prohibition should cause a considerable proportion of the men to leave the region there would still be an increase in the total amount of work done.

Good progress is being made in by-product coke, plants recently put in partial operation having put on additional ovens while other plants are nearing completion. From May 1 to date the Geological Survey reports show an addition of 20,000 tons a week to rated capacity of the country, practically all of this being in Pennsylvania and Ohio.

The coke market is without incident. A fair volume of foundry coke is coming into the market, some of it being sold through brokers with a small commission paid by the operator. There are scarcely any offerings of furnace coke but furnace representatives are picking up odd lots occasionally. The market remains quotable at the set limits, $6 for furnace, $7 for foundry, 72-hour selected, and $7.30 for crushed, over 1-in., per net ton at ovens. Coke screenings from old dumps bring up to $6.50, but coke breeze has little sale, particularly as the byproduct operations offer a cleaner material.

The "Courier" reports production in the Connellsville and Lower Connellsville region in the week ended July 6 at 349,795 tons, a decrease of 2695 tons.

Buffalo—The demand for all grades of coke continues good and if the movement of iron ore by lake (325,507 gross tons for the week), continues the consumption of coke will have to increase. The plan is apparently to make a record, for the vessels are unloaded much more promptly than they sometimes are. Coke is hard to get and none worth mentioning is put on the general market, the furnaces buying of the ovens direct. There is complaint of lack of both cars and men, but the output is heavy. Fuel coke is in large demand, with amount to be obtained small.

Birmingham—Trade is quite active and there is a steady demand for much more than the available tonnage of either furnace or foundry coke. According to the statement of a prominent official of a foundry coke producing company, unless there is a natural increase in the output of this grade of coke in the near future industries in this district will be compelled to secure from 3000 to 4000 tons per month from foreign producers. The output has been reduced in the past few weeks by an increased tonnage of 48-hour coke for furnace consumption by one of the larger companies, and labor shortage and irregularity are contributing factors in further crippling the production. A new selling price has been announced by the Fuel Administrator for New Castle 72-hour selected foundry of $8.25 per net ton ovens. Other producers contemplate seeking an increase in price schedules as soon as data can be compiled from June cost sheets.

Middle Western

MILWAUKEE

Dealers swamped with orders for anthracite upon which no scale of prices has been fixed. Margin of profit for inland dealers is cut down.

Consumers of anthracite coal in Milwaukee are still in the dark as to what they will be called upon to pay when their bills for fuel are rendered. It is said this condition will remain until the Fuel Administration establishes the margin of profit from vessel to consumer, which is being determined by experts. Inland dealers have been allowed a maximum profit of $1.35 per ton on anthracite, $1.45 on household bituminous from lake sources and $1.70 upon soft coal from Illinois and Indiana. The latter margin also applies to coke. This is a decrease from $2.25 per ton, or the margin originally set by State Fuel Administrator Fitzgerald. An extra charge for delivery is subject to the approval of county administration heads.

Milwaukee coal dealers are swamped with orders. The leading dock company has closed its retail order department, as orders now on hand will keep its teams busy until the middle of December. The allotment of anthracite to small dealers has been cut down to such an extent that it will take far into the winter before they can supply their customers.

The labor situation is such that coal dealers are seeking the privilege of dumping coal in the streets at points of delivery, leaving the problem of putting it into bins to consumers. Coal dealers place the responsibility for delayed deliveries upon the fuel administration, because of its failure to fix a scale of prices.

Effort is being directed in Milwaukee and other points in the state to provide means for financing consumers who are unable to place their coal orders at the present time. A Beloit, Wis., manufacturing firm is assuming the coal bills of its employees and reimbursing itself in installments from the payroll.

By awarding contracts for 42,000 tons of bituminous coal for state institutions early in June, or before freight rates were advanced, the State Board of Control effected a saving of $7500 on 15,000 tons.

Cargo receipts by lake since last week's report aggregate 14,919 tons of hard and 161,050 tons of soft coal, making the total recepits of hard coal since the opening of navigation 172,591 tons, and of soft coal 1,094,357 tons.

The Milwaukee-Western Fuel Co.'s Sixteenth Street dock, on the Menomonee River, which has been in course of enlargement and reëquipment for a year past, is now being stocked with coal.

ST. LOUIS

Market shows growing strength on Standard, contrary to expectations. Carterville scarce, and other grades likewise. Car shortage develops seriously on some lines and transportation lags. Railroads begin to confiscate coal.

Contrary to all expectations, the local Standard market has taken an upward turn. While there is still an overproduction of coal in the Standard field to some extent, the market is stronger and prices are better. The steam sizes also seem to be improving. This is perhaps the result of more activity in railroad buying in the Standard filed. In a general way local conditions show improvement. The domestic trade is still dragging now as far as new orders are concerned, but there is the usual demand that cannot be taken care of for Carterville coal.

The high class trade in the city that has in the past been using anthracite and smokeless coals has not as yet begun to place its orders, with few exceptions.

Car supply in the Standard field is not all that it could be, but transportation shows considerable improvement in the last week, and this may account for better car supply in the next ten days to two weeks.

With a heavier tonnage of Standard for the railroads the market is going to improve, and this will have a tendency to better conditions by reason that there will not be a surplus of steam sizes, which has been the cause of some idleness on account of unbilled steam coal.

In the Mt. Olive field conditions are about as normal as in any field in the state. The car supply is fairly good, labor is holding out remarkably well, and the production about equals the demand. In the Carterville field a car shortage still continues, and the mines are not getting anywhere near the time that they should, even with their reduced tonnage. The railroads continue to draw heavily from this field, despite rumors to the contrary that this condition would be eliminated for the time being at least. There has, however, been a little more free Carterville during the past week than for some time previous, but little of it is coming into the Missouri market.

There is not likely to be any disturbances in labor conditions for the remainder of July in this field, but the inroads that the draft will bring in August and September will cause a further decrease when there should be an increase in tonnage.

The conditions in the Duquoin field are somewhat similar to those in the Carterville field. There are no eastern coals coming into the St. Louis market at all, with the exception of a few cars of Ayershire, Ind., and other coals for gas-producing or gas-making purposes.

One unusual feature in the local market is that there seems to be a surplus of Big Muddy coal from the Murphysboro district. A little Arkansas has moved in the past week, and some outside gashouse coke, but the local market is one that has got to depend practically from now on upon the coal from the local Illinois mines.

An order has been issued that all operators and jobbers shipping coal into Missouri should make reports of such shipments to the Local Fuel Administration, so that they may keep check on the tonnage put into each locality.

The retail market holds up to the maximum for July, which is: Elkhorn Laclede and St. Louis Elkhorn byproduct coke, $12.75; Carterville lump, egg and nut, $6.20; Duquoin, $5.95; Mt. Olive lump, $5.70, and Standard lump, $5.45.

The market in carloads is:

	Williamson and Franklin County	Mt. Oliv and Staunton	Standard
6-in. lump...	$2.55@2.70	$2.55@2.70	$2.40@2.70
3x6-in. egg..	2.55@2.70	2.55@2.70	2.35@2.55
2x3-in. nut..	2.55@2.70	2.55@2.70	2.35@2.55
No. 2 nut....	2.55@2.70	2.55@2.70	.....
No. 3 nut....	2.55@2.70	2.55@2.70	.....
No. 4 nut....	2.55@2.70	2.55@2.70	.....
No. 5 nut....	2.05@2.20	2.05@2.20	.....
2-in. scrgs...	2.05@2.20	2.05@2.20	1.25@1.50
3-in. lump...	.....	.....	2.25@2.40
2-in. lump...	.....	.....	2.25@2.40
Steam egg...	.....	.....	2.25@2.40
Mine run....	2.35@2.50	2.35@2.50	1.85@2.00
Washed:			
No. 1.....	2.75@2.90	2.75@2.90	.....
No. 2.....	2.75@2.90	2.75@2.90	.....
No. 3.....	2.55@2.75	2.55@2.75	.....
No. 4.....	2.55@2.75	2.55@2.75	.....
No. 5.....	2.05@2.20	2.05@2.20	.....

Williamson and Fronklin County rate is $1.10; Duquoin field, $1; Standard and Mt. Olive fields, 95c.

General Statistics

NORFOLK & WESTERN

Below is given a statement of the coal tonnage from mines on the Norfolk & Western Ry. and from other railroads, for the month of May, 1918.

From:	Net Tons
Pocahontas field	1,505,115
Tug River field	310,860
Thacker field	281,929
Kenova field	103,171
Clinch Valley field	141,816
Other Northern and Western fields	12,918
Total Northern and Western fields	2,355,809
Williamson & Pond Creek R.R.	181,832
Tug River & Kentucky R.R.	57,641
All other railroads	81,709
Grand total	2,676,982